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ERRORS IN NAVIGATION,

Arising either of the ordinarie erroneous making or vsing of the sea Chart, Compasse, Crosse staffe, and Tables of declination of the Sunne, and fixed Starres detected and corrected.

By E. W.



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. apply or made Section of the sectio Milete Cart, Com



To the right Honourable, George Earle of Cumberland, Baron Clifford, Lord Bromfler, Atton, Vescie, and Vipont, Lord of Westmerland, and Knight of the most noble Order of the Garter.

Ight Honourable, and my very good Lord, being first finduced, by occasion of your Lordships imployment of me at sea, to apply my Mathematicall studies to the vie of Nauigation: I thought, these first fruits of those my sea-labours, could not bee more iustly due to any, then to your felf : as by whose beneficiall hand, they have been chiefly cherished, to gro we thus farre forwardes towardes their ripenesse: and to whom the caufes that most moved me thus vnseasonably (as it were) to pluck the same before the time, that is, the publishing of part hereof alreadie by one: and the stealing of an other part by a fecond man, and the daunger of publishing

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ing the whole by the third, are best knowne. For your Lordship can witnes (though in a greater matter, meaner witnelle might ferue) that not onely apart of this Booke was first set foorth by one : and that an other part thereof is more lately published by another in his owne name, in his Mappes of the world, and of Europe: but that the whole also was in going to the presse, vnder the name of one of the skilfullest Nauigators (as he was by many reputed) of our time, and nation, of whome fomething more then ordinary, out of his many experiments, and observations at sea, was (at that time especially, when he was to leave his life) expected to be brought to light, and left to posteritie, for their common good. But by good happe it was stayed, comining by the way into your Lo. hands : who prefently (by comparing it with the originall copy thereof, which I hadreferued to my felf) knewe it to be the same booke worde for worde, which I had made, and prefented vnto your L. almost feauenyeares before.

Hauing therefore (as I could for the present) made supply of such wants, as were in that Books, I thought it best to follow your

Lo.

Dedicatorie.

Lo. aduile, rather by publishing it my self, to acknowledg mine own openly, with all faults, which quieter time, and more leisure (whereof I have seldome had lesse store) might have amended: then either to have it by peecemeale dismembred, or vniustly chalenged by some other man as his owne: and so sett forth to the view of all men, much worse then I made it.

Desiring therefor your Lo. to vouchsafe the same the safegarde of your honorable protection, both against these, and other iniuries that may be expected of ignorant, or malicious tongues: as not knowing whome better to slie vnto to be protected, both for your honourable fauours towardes me, and for your noble authoritie, ioyned with no lesse skill, experience, and judgement in these matters belonging vnto Nauigation: I beseech the Lord of lordes, to increase your Lo. with all true honour, and happinesse in this life: and after this life ended, with endlesse blisse, in the life that lasteth euer.

Your Lo. to command in the Lord.

Edw: Wright,

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Tothe Reader.

He Art of Nanigation (as it is called) though a bath now beene in vie fome thousands of yeeres, yet how far it is at this day , from the perfection D which is and were to be defired, wee would scarce beleene (as a wonder, that a thing of fo great commoditie, Bould no more bee fought into, in fo

many ages :) but that, both the Bookes of the learned are extant, to testific; and reason (approoned by often trial) doorh plannet, then the principall melmes, and motivalments this Art ofeth, have been thus long fo farre from this perfection, that contrarinife they have beene, and are much stained, with

many blots and blemishes of error, and imperfection.

The fea that the best meane the mariner back to knowe the course from place to place , (at it bath beene buberto generally made) is fo faulty in the very foundation and groundworke thereof that is in the geometrical lineaments of the meridians, paralets, and sambes described therein) that hereof there may wrife to groffe error de may saufe the mariner to mille one two yeathree whole points of the compasse (and more sometimes in a furre northerly navigation) in finding the course from place to place. Whereof it may also be necessarily inferred, that fellowing the direction of his chart in fuch fort as hath beene veed for finding the distances of places, be may erre one balf, yea three quanters and more sometimes in those northerne partes: in taking the distance to be twice, thrice, yea four etimes greater then indeede it is

2 The Compasse (the chiefest instrument for keeping the course shewed by the chart) by the variation neglected, as by fome

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* some it bath beene may cause you erre an pobole point or two in the courses of dinerse places: and not rightly wied hath bred booke, 3. chap. much confusion in many parts of the chart in laying out many places in falle courses: which must needs folow when the chart is made according to the direction shemed by the pointes of the Compasse without abatement or allowance answerable to the variation in every place. This may especially bee seene in those places where the variation is greatest, as upon the const of Florida. Nona Francia, and New found land; where some also seeking to awayd this inconvenience, have fallen into an other as ill er worse than the former, in making a double scale of latitude. And thus one error as a fruitfull mother breeding another and one abfordatie admitted drawing many with it : st will manifest. if appeare by exact discourse out of these groundes i what partly through the falle projection of the chart, and partly through neglecting, or not rightly ving the variation of the Compasse) that it can not otherwise be but that the ordinary charts are in many places much like an inextricable labyrinth of error, out of which it will be very hard for a man easily to unwinde himfelf.

Hereto accordibe often experiments and usual practife of many wel experienced and indicial mariners and sea men of our time, who confesse, that in failing from the west Indies to the Azores, they have often fallen with those Hands, when by their account according to the chart they should have beene 150. or 200 leagues to the Westwards of them. The like hath beene found in Payling from the Azores for Ushent, as I have also partly feene in the little experience I have had at fea, where we were comme within sight of that Iland, when by account of the ordinary chart we should have beene 50. leagues short of it.

And as concerning the courses fromplace to place, I have observed that some of our masters take a mise course, in not trusting to those courses which are showed by their charts. But first yetting the selues into the height or paralel of the place to which they are going: and withall; knowing assuredly whether they be more eastward or westward than that place; they then proceed almayes

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alwayes heedfully beeping themselves under that parallel, till they come to the place desired. Then which way of sayling there is none indeed more certains and insallible for the sure finding of the place a sugned: but it hath this inconvenience, that it maketh the way longer then otherwise it should be, if the streight course were kept.

But to returne to that from whence we have a little digrefsed, by these experiments and practise of the skilfullest mariners it is manifest that they themselves do often find the imperfections of their charts, in shewing the courses and distances of manie places each from other. Whereto we may adjoyne the experience of the best Hydrographers of our time : who dayly making their Charts after the accustomed manner with firei ht lined rumbes and degrees of lattinde, enerie where aquall, have found such difficulties in labouring to bring their marine descriptions to some due corre pondence of trueth in she courses, heights and distances, that tyred herewith in the end, they have holden it for impossible, to make the chart agree in all these with the globe. Wherein notwithstanding they erre, by making too generall a conclusion, in boulding that to bee simply impossible, which cannot be done by such a way & meanes. as they know and ve.

3. The Crosse staffe (the principal instrument, that bath at sea beene most generally vsed, for observing the attitudes of the Sunne, or start the thereby to know more assuredly the latitude, and so to examine and rectific the account of the course, kept by diversion of the Compasse upon the chart is there be not abatement made answerable to the eccentricitie of the eye (that is to the distance wherewith the center or point wherein the sight beames concurre within the eye is further backward then the end of the staffe) may through neglect of this abatement cause error in taking the height observed to be greater then indeed it is, by 10,20,20, min, yea an whole degree and more sometimes, if the height be much, the staffe small, and the eccentricitie of the eye great.

4 But both this staffe, and all other instruments (though

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mener so well made and vsed) can doe vs but small pleasure; for finding the latitude at sea, if the declination of the Sunne or starres which we observe be not also knowne. To this end there. for there have beene made tables of the declinations, both of the Sume and fixed starres: yet such as even that which hath beene publikely commended as not differing from trueth in any place abone one minute (I meane the regiment of the Sunne, let forth by R.N.) doth notwithstanding differ from trueth in mame places 10,11, or 12, minutes. And as for the fixed flarres, scarce one of them bath his declination truly set downe and apreeablie to observation. Yea oven the Pole-ftarre it self though it be better knowne, and more observed by the most part of seamen then all the rest: and indeed as it mought be vsed (being to be observed at any time of the night all the yeare long might fland them in as much flead for finding the latitude as most of the raft: yet in the bookes of nauigation that are most common amonost English mariners, the distance thereof from the Pole is mide to be 28 minutes more then it should be. No maruaile therefore if the mariners complaine (as I have heard them (ometimes) that they cannot make their observations of the latitude by the Sunne and this starre to agree.

Neither is there more trueth to be looked for in the declinations of many other principall fixed starres, published in those bookes, diner a of them erring from truth, one, two year some of them) three whole degrees and more as in the treatife following Shall be shewed. And these errors in the declinations of the Sunne and fixed starres not onelie I, but also the R.W. Sir Christopher Heydon knight, and the noble Lord of Kund-Rrupp, Tycho Brahe, founder of Vraniburg, with the gracious Prince William Landtgraue of Hassia, father of him that now is, have often found by many and most diligent obserwations, with large and exact infruments, wherin both minutes and half minutes might be easily discerned. Notwithstanding, if anie stand in doubt hereof, I wish that he himself also would bestow no lesse cost, time and diligence, to make often beedfull and exact observation then either the Prince of Hassia, or Tycho

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Tycho Brahe or at least but as my felf have done, and then let him beleeve that be shall fee to be true with his owne eyes.

These errors therfore in the Chart, Compasse, Crosse staffe, and declinations of the Sunna and starres, I have in the treatise following laboured to reforme to the vimoss (year ather beyond the vimoss) of my poore abilitie, neglecting other studies and courses that might have been more beneficiall to mee: which may argue my good will to have proceeded further, to the amendment of such other faultes and imperfections as yet remains besides those that are alreadin specified, and that especially in two pointes, that is, in the courses and longitudes of places.

Thereforming of the Chart in reducing all places from these varying courses wherein now they are set downe to the true positions they have each from other, by separating the variation (wherewish they are in the ordinarie (harts for the most part interiningled) were a busic peece of works; jut fach as were most worthe, and necessarie to be taboured in at without which the Charts mappes, and globes, or any other Hydrographical, or Geographical descriptions, cannot be freed from many intricate absurdations, wherewish now they must used in many pares be postered: because the courses and positions of places are in them set downe at they were observed by the varying Compasse, with-

ent separating the variation afterwards, that so the true comses and positions of places might be knowne.

The longitude also would well deserve both labour and soft to be both skilfully and therath bestowed, for the studing there of a whereby it were possible to bring it to that passe side measons of the Summe, and Moone, and places of the fixed starres being verified, whereof that noble Tycho Brahe affordath great hope) that the industrious and willing minded mariner moughobe empable thereof, in such fort, that for the most party when the mome and stread starres appeare, her might be able hereby to know what longitude he win (even at sea) more truly the many have done by their dead reckning, in sayling out of the bay of Mexico to the Azotes, or from News and land to England

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England, or almost from the Azores to England. But on land, the longitude might by this meanes be found, as exactly as the latitude hath beene by many observers at sea. And so, opportumities of observation with meete instruments on shore not being negletted, (especially in long voyages farre Eastward or Westward) many most notorious errors in the longitudes of places would some be corrected, where with the most excellent arts of Geographie, & Nauigation are verie much blemished. For who that loueth truth, can patiently endure to heare the Mariners common, and constant complaint of 1 50,0r 200 leagues error in the distance betweene the bay of Mexico and the Azores: or (that which is yet most intollerable and monstrous) of 600 leagues difference in the distance betweene Cape Mendosino and Cape California, some making that distance to be 12 or Iz bundred leagues, where others will have it, and that more. probablie to be no more then fixe or feuen hundred

But for a much as the charge, though not great (to speake of) of providing meete meanes for supplie of these wants in the cour fes and longitudes, but chiefly in the latter, exceedes the meane abilitie of the most part of them that are most addicted to these vng sinfull studies (I must not say ungratefull, albeit in these dayes they prome most unprofuable to their greatest lowerse) Therefore for my part they are like to rest, as they are untouched, and onely commended unto a kinde of hope (whether vaine or no I know not) of some Meccenas at length of munificent fpirit to be raised up, though not to do as that magmificall Tycho in his Vraniburg, as well by his owne high reach of wit and learning, as by a bountifull hand to his affifants and followers, yet at least to have some due consideration, both of thefe, and of such other wants and imperfections as yet remaine in so great and excellent an art as this of Nanigation is, that it may have some increase, the as Astronomie bath much admauncement by Tycho Brahe alone, who for his deferned re-

nowne cannot be too oft named.

Doubtles there is no man(cosidering that the art of Astronomy, which mounteth up unto the heaves doth minister aid unto

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this of Nanigation, which courfeib upon the waters) can denie the excellencie thereof or the profitablenesse enther. But if he will,my purpose is not to stand uponit, nor to connince him by reasons, by records, or by the more wonderfull discourries in this our age, made to the furthest parts of all the earth, and round about the whole compasse of the same, whereby we have beene made partakers of the most rane and richest commodities and treasures of the vimost Indies, and llandes of the world, and they likewise have participated with vis (or els they have had the more wrong) in the most precious treasures of heanenly trueth. All which and much more shen can bee thought of or now spoken performed chiefly (next under Gods prousdence) by the rules and directions of this art, who feeth not that by how much the more excellent, and unto mankinde as bundantly profitable it is, so much the leffe ought any notorious error to be tolerated therein, and fo much the more aught all whome it may concerne (yea but its good will onety, if it may do good) to endenour themselves that it may be brought to the highest pitch of perfection. Iknow not then if any one be unto fo excellent an enterprise drawne on, to give the best furtheraunce in him tyeth, why he should for his labour fall into any dayinger of reprehension at all. Yet it may be, I shall be blamed by some, as being to busic a fault-finder my self. For when they Shall fee their Charts and other instruments controlled which fo long time bane gone for currant, some of them perhappes will scarcely with pacience endure it. But they may be pacified if not by reason of the good that en weth bereipon, yet towords me at the least because the errors I poym at in the chart. have beene beretofore posited out by others, especially by Petrus Nonius, out of whom most part of the first Chapter of the Treatife following is almost worde for worde translated; I for my part desiring rather that faults should be found by others then by my felf and labouring much more, as for a thing much better, and furremore needfull, and profitable to be a fault mender then a fault finder.

Or els I may formuch the more be misliked, because in see-

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bing to amend, some will thinke I take upon me too much: For tome will fay, and of those perhappes that have beene employed in sea affayres all their life long, that all this we go about is. more then needs. For they without all this ado, have ener performed their charge with good successe. and are now too olde to give eare to these innovations. But other seafaring men, who acknowledge the need hereof, are ashamed peraduenture to receque (as it were) either correction from the schooles, or di. rection from the land and therefore flick not to condemne V'nimersities and all in comparison of their manifold experiments. Others asso as more indifferent for the matter, will have a fling yet at the person, thinking this reformation which is professed, to spring out of other mens fountaines. Which all (because we are now about a worke of amendment) must also (if they will beare reason) amend their opinions. For the first which seeme most unreasonable, do not consider being uddict to these unreformed instruments, how like they are unto those auncient maifters of shippes, whom M. Bourne maketh report of, who not many yeres since, wedded likewife to their accustomed vsage, have mocked them that have v'ed Charts, or (rosse stanes, laying they cared not for their sheepes skinnes, they could keepe a better account upon a bourd: and them that observed the Summe or starres for finding the latitude, they would call sun-Booters, and starre shooters, and aske if they had hit it. But marke what commeth hereof: for one of these maisters was he as I take it, of whom an ancient (eaman (yet living as I thinke) once tolde me, who having undertaken the charge of conducting a hippe from England to Saint Michaels (the first of the Azores) and after long seeking, not able to find that Iland, for hame and forrow cast himselfe overbourd. Wherefore these men if they consider it well, have no cause to boast of successe without skill, but to thanke Godfor both, that is, for their great and often good happe and safetie, and for their skill also were it smaller then indeed it is. For I will do them no wrong, but do freely graunt and acknowledge, that from any one place to other, the course, height and distaunce may be truly set downe

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in the ordinarie Chart, wherein the Rumbes are right lines, and the degrees of latitude enery where equall; and fo by that (bars they may faile truely inough from hence to Russie or Island, or any other place. But if by the way they should croffe omer from the one to the other following the direction that their Chart Beweth them, they cannot but erre a great deale, either in course, or distance, or both, especially in those Northerty namigations. Why then should they where there is dannger of wandring, refuse help of any that is willing to showe a botter course? But to come unto those that may obiett I do but actit agere, in doing no more then bath beque done atreadie by Gerardus Mercator, in his uniner fall mappe many yeares fince: and in publishing something already published by Iodocus Hondius, in his greater mappe of the world and of Europe; now of late: I must aunswere that indeed by occasion of that mappe of Mercator, I first shought of correcting so many and erosse errors and abfurdities as bereafter are shewed in the Sea chart, by increasing the distances of the Parallels, from the equinottiall towards the Poles, in such fort, that at every point of latitude in the Chart a part of the Meridian might have the fame proportion to the like part of the Parallel, thatit bath in the globe. But the way how this should be done, I learned neither of Mercator nor any man els. Ind in that poynt I wish I had beene as wife as he in keeping it more charity to my felf. For fo perhappes it might have beene more beneficiall unto me : neuber fould any man have had cause to thinke at the first sight of the fourth Chapter of this booke, that all I have there fet downe is stolne out of one of the fore aid mapper of Iodocus Hondius. . But were I brought before a Indge, I should for my absolution, and Iodocus his condemnation, make the contrarie to appeare, and that by his owne confession in his letters to me, and to a friend of mine which I have to shewe written in Latine with his owne hand: To me his writing in English is thus much in effect.

viz. The booke of the Sea-chart. I heare that you are somewhat offended with me, because I have taken those fewe things out of your hand-written booke, whereas I promised you that I would not publish

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For it something grudged my conscience, euen to publish this little, if the distance of places would have suffered me conveniently to send letters vnto you. I was purposed to have set this forth vnder your name: but I feared that you would be displeased therewith, because I have but rudely and without elegancie translated it into Latine. Truely I tolde all my friends plainly that you are the Author there-

of and I tell them fo still, &c.

Andin his Letter to master Briggs now profesor of Geometrie in Grefham College, he writeth thus being turned into English. I have written to M. Wright in excuse of my felf. I am verie forie that he is angrie with me for that cause. I pray you learne of him how he is affected towardes me, and write back vnto me, and excuse me vnto him as much as you can. I would have published his whole booke for the common good; if I might have done it without breach of my faithfull promise. And surely my conscience grudged to publish even this little which I have taken out: but the profit thereof moued me, &c. At Amsterdam from the figne of the fick Pope. The trueth is that at his owne infant request, when he wrought here at London, some of my friends also procured by his flatterie, persuading me thereto, I was content to let him have this booke for a fewe dayes to pervse: be also assuring me upon his faith and credit, that he would non publish is, or any part thereof without my knowledge and consent. But how well and honestly he hath performed that protestation, grounded upon faith & credit, the world may now fee: and bow thankefull be bath beene to me for that which hath beene so profuable and gainfull unto himself, as may appeare by so common sale of his mappes of the world, and of Europe, Afra, Africa, and America, (al which had bene yet vnbatched; had be not learned the right way to lay the groundworke of them cut of this booke) I my felf know too well. But let him go as he is.

Now if any hall think it to be beyond a land mans skill, to find

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find faults of masters belonging to the fea mans are and profeffion they must know if they be yet to learne, that one that is but reasonable acquainted with Geometrical conceits may as well, if not better then most sea men know the nature and properties of the spherical forme of the earth and fea with all confequents and dependances thereof. By consideration of which, the true understanding and reason of the nautical plans phare or Seachart, may by him that bath beene but meanely conner ant in Mathematicall meditations be better apprehended, then otherwifeit can by the fea-faring man, though he fpend his whole life in Tailing over all the feas in the world. The like may be faid of the Croffe staffe and Compasse and of the regiments or tables of declination of the Sunne and fixed starres, and of all other principall meanes and instruments serning for naniga. tion. But it is framge to fee the difference of things that in this worlde is made by the difference of bands from which they are so be received, howfoever the things them felues be. For let Hannibal a Captaine discourse of warlike affaires, be it never le diforderly and out of reason or season, yet all (for south) must needs be of great discretion and wildome became be bath bandled that which be freaketh of . But let Phormio a Philosopher speake of the some, at the least in the bearing of Hannibal be his Oration farmifhed & beautified with never fo much reading learning, indgement and eloquence, yet muß be (there is no remedie be either a foole or a mad man for his bire. So by all likelihoods, the case will stand with this poore Treatise of mine which if it had come forth unto publike view , from out of the bosome (as once it was tike) of a maister at sea of great reputed excellencie, it had no doubt then found the favour. which like inough now it shall want : all winds then would have freeth blowne it into the pleasantest haven of every mans (at leastwife of enery fea mans fanourable entertailment. I shall therefore with their patience fet downe the matter aut mas, that none may mistake a trueth, which is daughter, not onely of sime, but of occasion, as bereby may appeare. It is not unknowne to some of good place and reckoning, that one of the skilfullest naniga.

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namigators (as he was by many accounted) of our sime and Na. tion, who died in Sir Frauncis Drakes last voyage, when he came to that extremitie of sicknesse, that he saw there was no other way but one with him, was reported to have gathered and bound togither into a bundell all his nautical notes and obsernations, and to have cast them into the sea. But soone after notwithstanding that foresaid report, there came more comfortable newes by a Captaine that was familiarly acquainted and connersant with him in that voyage, and during the whole time of his sickenesse, in whose armes also he died: who moving some speach unto him touching something of fir Frauncis Drakes that might then after his death be looked for to be brought to light, concerning Nauigation: Tush (saith he) for that matter there is not much to be looked for at his hands, bee had little skill in that art. Why? and will your self then do any thing? quoth that Captaine. Whereupon this great nanigator drewe forth a booke out of his bosome, and delisered it unto this captaine not long before his death. This booke was shewed by the same Captaine to the R. Honourable the L. bigh Admirall of England in the Cales voyage, as being made by that famous Name ator which his Lordship also (as it was reported) thought good should be perused and published. These newes moved some expectation of that booke : fo as the right Honourable, and my verse good Lord the Earle of Cumberland, hearing of it, was desirous also to have a sight thereof, and remembred me unto that Captaine, as one not insufficient to peruse and correct the same. And hereupon the booke was brought onto his Lordship, at the time and place appointed at Westminster, and was there also delinered unto me, to be perused and corrected. Having therefor opened it, & beginning a little to turne oner the teames, to take some generall view what matter mought be conterned therein: I first espied a Diagramme, the like whereof I knewe verie well I had made in a booke of mine. And herewithall I was the more moned to fee if there were any more that I could know as well as the former: turning over therefor two or three leases more, I presently espied another Diagramme also, where-9992 with

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mili I manuscrell acquainted, as with the former to for I found not onely the very finis Diagramme, but (that which made me the moreto maruaile for the prefent) folowing also in the same order us I well remembred it did in my booke. Being therefor yet more earnestly stirred up bereat, and wondering what the reason moughs be, that we should thus agree, I betooke my self to the reading of that booke. And looking suft upon the suff lease thereof, and asterwardes in many other places, I found it enery where to egree with mine, and to be a copie of the same booke worde for worde, which I made and presented unto his Londship almost senen yeared before, as the next morning it plainly appeared both to his Lordship and to the captaine himself that brought it, by comparing it in all points with the original exemplar of the same booke, which I then brought unto

bis Lordfoip.

One crime there remaineth which may feeme more inft then the roll, and jet bad I almost forgot it : namely, in that I bane hadin this treatise no regard of the parallax of the Summe, both in making and using the table of the Sunnes declination . But the refraction of the Summe making him to appeare higher then be is may fland aunswerable for it without error easily obsermable at lea. Notwithstanding I granm it to be the exact of way (especially on land) to base confideration both of paralax and refraction: but first there was found by observation, certaine rules of this refraction, (whereto ley/ure and other needfull meanes have not hitherto ferned me) for as good it is to have consideration of neyther, as of the paralax onely: and no great matter if both be neglected at fea, where (in mine opinion) he quites himselfe as a verie good observer, that shall not in obserwing the height of the Sume, or flarres erre more then swife fo much as can arise by neglect of both refraction and paralax toguber. But I feare that whileft I labour to fatisficall, I fall offend some as making too long a Preface to fo small a volume, I will therefor haften to an end, onety shewing the summe of this treatife: which I thought good to offer with your view, as a compendione representation of all that felloweth, and rather to

The summe of this treatise.

fet it apart by it self, then to include it as I was purposed within this praface, which is beyond his bounds alreadie: and therefore here I will commit the fauourable reader as my self, unto the protection of the Almightie.

The summe of the Treatise - following.

He Treatife following containeth foure principall parts, whereof the first may be called Hydrographi-G. cal, wherein are fet downe the errors of the common Sea chart, with right-lined rumbes and degrees of latitude enery where aqualithen the way to anoyd thele errors is geometrically demonstrated, and out of this a Table is calculated, and the vee thereof shewed, for the true and easie diniding of the Meridians in the Chart into tennes of minutes, or sixth parts of degrees of latitude, proportionally increasing towards the Pole. Whereto is adjoyned as arising from thence the Table of Rumbes shewing by what points of longitude, and latitude each Rumbe is to be drawne from the aquinoctiall, till you come within a minute of the pole: with help of which Table, the Rumbes may in any Chart, Mappe, or Globe, much more truely be described, then by those machanicalt wayes long since published by Petrus Nonius, or tately practised by some Globe-makers in England. After this followeth, a most plaine and sensible demonstration of the disagreement of the common Sea-chart, and of the agreement of the Globe with the chart before described, the v'e of which chart is shewed in the Chapter next following: where also (the longitudes and latitudes of any two places being given) the way is fet downe how to find their distance, mea ured either in the legment of the rumb, or in the arch of the great circle intercepted betweene them both machanically with ruler and compasse, and mathematieally by the doctrine of triangles, whereby it may without much difficultie be conceyned, how nauigation might by Arithmetical calculation onely, be performed without Chart or Globe, onely 9993 the

The summe of this treatise.

the longitudes and latitudes of places being knowne.

The second principall part of this Treatise may be called Magneticall, because it intreatest of the variation of the Compasse, sharing how the same may be found at sea (the lattinde being ginen) by one observation of the Sunnes beight and point of the Compasse wherevoon he is at the same instant, before or after woone with help of the Globe or Aftrolabe. Which way of finding the variation is also exemplified with a Table of such observations as I tooke both at sea and on shore, in the voyage of the right Honourable the Earle of Cumberland, in the yeare 1 589. And becamfe the Globe and Aftrolabe are fuch inftruments, as enery one cannot easily have at Sea, I have also shewed how (by the Sunnes point of the Compasse, or Magnetical Azimuth and altitude ginen by observation) the variation may be found, either mechanically, with ruler and compasse, or mathematically by the doctrine of triangles, and arithmeticall calculation.

The thirdpart may be called Geometricall, intreating of the Crosse staffe, and shewing how such errors may be anoyded, as have beene commonly committed in the vse thereof, either by reason of the paralax, or eccentricitie of the eie, or by the height of the eye above the water, or by the paralax of the Sunne.

The fourth and last part may be called astronomical, wherein my chief intent was to corect the errors that are in the ordinarie Tables of declination of the Sunne, and fixed starres. To
which end there is first set downe a table of the declination of ewery minute of the eclipticke in degrees, minutes & seconds, calculated for the greatest obliquity of the Zodiacke, as it is sound
by observation in this age 23. deg. 30. min. Whereto is adioyned the vse thereof for the readie sinding of the place of the
sunne by his declination given: or contrariwise for sinding the
sunnes declination, his place being sirst knowne. After this is
shewed the way and meanes I vsed for exact observation of the
sunnes Meridian attitudes: with a table of those observations,
for source yeares togither, that so the more certaintic might be
had of the declinations and places, and of the whole course and

motion

The summe of this treatise.

motion of the sunne: and that by comparing togither so many obfernations, the funnes eccentricitie and apogaum might more assuredly be knowne. By knowledge whereof, the way was layd open for making the Ephemerides of the funne there fet downe: without which the regiment of the sunne next following (which Imay commend as free from error observable at lea, and ele dome differing one minute from observation on land . and for which principally all the former paines was overtaken) could not so easily have beene made. Now if any shall thinke shat most of this fourth part going before this regiment, might have beene omitted as being impertinent to the vie of mariners, and exceedung their capacitie: I aunswere, that it was not my purpose, neither could I in all places, applie my felf to the most part of feamens capacity: knowing many that would not be content with this regiment alone, but that defired more to know the root from whence this fruit grew: whose desire I was also willing to satisfie as I could for the present, having seldome had a more inconmenient season for such a purpose Then followeth a table of 23 principall fixed flarres about the aguinoctial, that have beene most commonly knowne, and observed by seamen, with their declinations corrected: and another table of as many more of the notablest starres about the Pole is thereto annexed, with their distances from the pole corrected also & verified by diligent obfernation on land. To thefe is added a table of the fumes right ascensions (resolved into houres & minutes) for enery day of the yeare with the we therof for finding at what house any of those farres commeth to the Meridian at any time of the yeare : that hereby the mariner might know at all times, when they come to the meridian. of to the easilier learne to know of observe them. Lafty, I thought it not impertinent to adjoyne to this treatife, that which gave the first occasion of writing the same, that is the right honorable the Earle of Cumberland his voyage to the Azores performed in the yeare 1 589 wherein his Lo. tooke the towne and platforme of Fayall. And so for further satisfaction in enery one of these particulars, I referre the friendly reader to the treatife it selfe now folowing.

Fare well

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VLTS

in the common

Sea Chart,

With Rumbes expressed by right lines and degrees of latitude, every where equall.



S the Sea Chart is one of the especiall Instrumentes that Mariners have for theyr direction in failing, fo there is not any wherein there are fo great and daungerous errours.

I For first, what places so- Errour in the euer are described therein, the length of them (from the length & East to West) harh a greater proportio to the bredth breadth of (from North to South) than indeede it ought to common fea haue (except it be at the æquino&iall:) And fo much charce. the more this errour increaseth, by howe much the further distant those places are from the aquinoctiall : euen as the proportion of the Méridian to the Paralell, increaseth the more, the nearer you come to either Pole; so that at the paralell of 60 degrees latitude, the proportion of the length to the breadth

A detection of Errors

is twice greater than indeede it should bee; and that because the meridian is double to that paralell, and so in all the rest, the proportion of the length to the breadth shall be greater than the trueth, in the same proportion, wherewith the meridian exceedeth the

paralell.

As for example: in the common sea Chart, the proportion of the length of Frielland, to the bredth theret, is two-fold greater than in the globe (which sheweth the true proportion of the length to the breadth) because the meridian is double to the paralel of that Iland. In the Ilands of Groenlant and Groclant, the length to the bredth hath a source-fold greater proportion in the common Mariners chart, than it hath in the globe; because the meridian is fource-folde greater than the paralellos those places.

Error in finding out the difference of longitude by the common sea Chart.

mile ser und

The way to finde out the difference of long itude, by the common sea Chart, is true at the acquinoctiall onely, and neare about the same may bee vied without sensible errour: because there only the meridian and paralell are equall. But on this side or beyond the acquinoctials there is errour committed proportionally to the difference of the meridian, & paralell, that is, the difference of longitude found out by the Charte bath the same proportion to the true difference of longitude, that the paralell hath to the meridian.

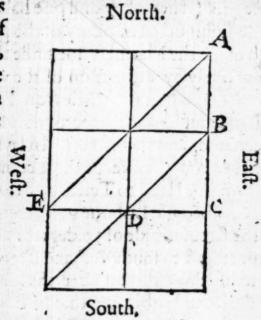
As for example: at the paralel of 60 degrees in the common mariners Chart (wherein the degrees of the meridians, and paralels are equall) admit B D be two places bearing each from other fouthweaft and northeaft differing in latitude to much as is the

arke

in the Sea Chart.

we will suppose to be one degree, therefore by the

ordinarye Chartes
the difference of
Longitude C D,
that he likwise one
degree: but yet in
trueth, bicause the
meridia is double
to that paralel, and
consequently, a degree of the meridian double to a degree of that paralell, therefore B
differing a degree
in latitude from D



should be placed twice so farre from C, that is at A, so as A B C may be all counted but for one degree of the meridian, and so be equal to two degrees of the paralel, whereof should followe that E C should be the difference of longitude, that is, two degrees, as the trueth is in the globe, whereas the common Mariners Chart sheweth the difference of longitude to be but halfe so much. And yet not-withstanding if you go nearer to the poles, you shall erre by their Chart a great deale more, even as the proportion of the meridian to the paralel increaseth more and more.

But this errout in shewing the difference of longitude, shall yet further appeare by this example of Petrus Nonius.

In

A detedion of Errors

5 In the Mariners Cherr, the distance betwikt Lifbonedad Tercera, is fer dissome to be 2,62. Spanish leagues (whereof 17 and one halfe make a degree of the Equinoctial or of any of the greatest Circles) for to much the Mariners doe finde that distance to be. not onely by estimation of the way that the Shippe maketh, when they fayle from East to West to that Iland, but by another account which is much more certaine, and that is this. In fayling from Lisbone to Madera, they keepe their courle fourhwest, and from this I land to Tercara, they faile northwest. Now because Lisbone & Tercera have both almost the fame latitude of 39. degrees and in falling fro the northeast to southwest and likewise from four heast to northwest, you alter the longitude as much as the latitude (because that in both those courses the angle that the way of the ship maketh with the meridian, is equall to halfea right angle: and the Iland of Madera hath almost aldegrees and an halfe of latitude towardes the north forthat the difference of the latitudes of Lisbone and Madera, as also of Madera and Tercara is about 7. degrees and 1.) Therefore the difference of the longitudes of Lisbone and Madera, & likewise of Madera & Tercera shal be 7 & dof the fame degrees of the meridian both which added together make the whole difference of longitude betwixt Lisbone and Tercara, to be 17 degrees of the meridian, which are equall to 262, and one halfe Spanish leagues. But in the paralel that passeth by the 39 degree of laritude, wherein (almost) Lifbone and Terezralare lituate, there are more degrees in the same space, according to that proportion where-

in the Sea Chart.

Therefore the true difference of longitude betwixt Lisbone and Tercæra, that is, the arke of the paralel or Equinoctiall contained betwixt the meridians of those places shall thus be found out.

peripheries, and consequently the semidiameters, and like arkes of circles have the same proportion.

Also it is manifest that the sine of the complement of the distance of any paralell from the Equinoctiall is the semidiameter of the same paralell.

Now the distance of the paralel of Lisbone and Tercara from the Equino diall is about 39 degrees, the complement wherof is 51 degrees: whose fine is 777 which is the semidiameter of the foresaid paralel, in such parts whereof the whole sine containeth 1000, which is the semidiameter of the meridian. Therfore by the rule of proportion inversed, if 262. Spanish leagues make 15. degrees in the meridian, whose semidiameter is 1000.parts: then in the paralel whose semidiameter is 777. of the same partes, they shal make 19 degrees, & 137 parts of one degree. that is,18 min. & litle more: which (if it be true that the course from Lisbone to Madera is southwest, & from Madera to Tercæra northwest: & that the latirude of Madera is 31.deg.30.min, and the latitude of Lisbone and Tercera 39 deg.) shal be the difference otlangitude betwixt Lisbone & Tercera. Whereas Ortelius & Mercator following as it seemeth the masine Chartes without correction in their vniuerfall Maps, make them to differ in longitude scarce 15, degrees of their paralell, as if it were equall to the Equinoctiall. 3 More-

A desection of Errors

Errors in the lying & bearing of places one from another in the common sea Charre,

Morcouer, they are deceived not onely in the firmetion of many places, which the marine Chart theweth to be under the fame Meridiane but also in the lying, or bearing of other places each from other. For the Meridian is a certaine rule of the politions of places. If therefore erroun shall be committed in the situation of the Meridian, there must needes be errour in the inclinations of the other numbes, poinces or lines of the Compaffe. And therefore norevery inclination, or respective position of place to place, which is ferdown in the marine Chare, is to be taken for true : but that polition or inclination enely, by which fome have fayled from the one place to the other. This may be leene , in fayling to India. For the marine Chart placeth that promontory of Africa, called the promontory of 3. pointes, being in latitude towards the North, 4 depress and one balfe, and the Hands of Triftan acugna (which have 36 degrees of Southerne latiende, voder the selfe same Meridian : Also the marine Charte heweth the distance betweene these 1lands and the premontary of Good Hope, to be almost 400 leagues both which por with standing cannot fland together. For if all the flore fro the prominently of g. pointes unto the promontory of Good lape be rightly described, and the promonraryof spoinesallolic vader the time Westdian with thole bands : ir wull needes be that the farefaid diffanceis much leffe Burif ir benot leffe it transoribe obadahey should have the fame Meridini with the probuomory of 3 pointes, but must needs he more to the Workward. Heereof it commeth

in the Sea Chart.

that the Marriners are very oft deceived, whe they goe from one place to another, following that direction which the les Chart heweth them. Which place whon they find not by that course, they think that the cause of that errour is either some swife current of the Sea, that carrieth them another way! orefe the declination of the poles of the Loadefrom the true poles of the world : although (perchaunce) they erred onely, for that because they knew not how those places did beare one fro another.

4 Neyther are they onely deceived in that, be- ting of places cause they thinke that the lea Chart can shew the fi- out of the cotuations of all places : but also because that when mo sea Chart they will translate the sea coastes out of the Chart into the globe. into the Globe, they doe it, having respecte onely to the numbers of the degrees of longitude and latitude found therein, and no otherwise then when they fet in the fixed starres into a celestiall globe. So. it commeth to paffe, that not onely those errours are committed, which doe necessarily arise out of the common fea Charte: but other errours allo, which might be auoyded, if they first turned into degrees, those distances of Longitude which they have truely knowne, and then followed the Longitudes and latitudes of places.

In thewing the diffences of places, there is as Errour in great errour committed, as in any of the former. diffances of For example: If you imagine 2. thippes to bee vn- places in the der the Equinoctiall 100, leagues afunder, and that Charte, each of them should sayle from thence due North or South under his Meridian, untill they come to

the

Adetection of Errors

the paralelliof so degrees latitude they should be there but onely colleagues diffant , because at that paraiell the Meridians are diffant but halfe fo much one from another, as they were at the Equinoctially as it may most manifestly appeare by the globerand ver the Charte will shewe, that those two shippes have the felfe fame diffance of 100 leagues, being under the 60 paralell, that they had before, beeing vader the Bouisoctiall, - was and the standard

of the Com-

Errour in kee- 6. There is yet another error remaining (though ping alwayes all the former were anoyded) which arifeth hereof, the fame point because that by the direction of the Compasse they bend, and turne the hippey in fisch lorie, that they confraincit alwayes to make the fame angles with the Meridian. As when they fayle from Vinentto to Cape Rafo, both lying under the fame paralels they guide the fhippe in such forte, that it maketh alwayes right angles with the Meridian, & forholding on their course due West, they keepe themsclues alwaies under the same paralell; whereas notwithstanding, there is a more certaine course, whereby they may goe from one place to another; withour that loffe of way, which they must needs make that keepe shelchues alwaies vuder the fame paralellis in world who be to would your such

. There is moreover another commoditie in this kinde of failing, that we may finde every day by a more certaine accompt what way were have made, and know in what place we are will industry with

But this way is not to bee defined by any of the leffer circles, but by a great Circle which is to bee drawne by those two places thand the aske of than

21.1

great

in the Sea Chart.

great Circle conteined betwixte the same places is leffe than the arke of the paralell which lyeth betweene them, as may bee concluded by an euident and necessary reason out of the principles of Geometrie: much like as a straight line is shorter then a erooked, both beeing extended betweene the fame prickes. Therefore this commoditie is also berewaro adioyned, that in fayling by a great Circle, the way is more short, and compendious. But he that entereth into this course of sayling, must knowe, that hee must chaunge the pointe of the Compasse (whereupon he guideth the shippe) not once onely, but very often: and that because of the variable, and inconstant inequalitie of the angles, which that great Circle maketh with euery new Meridian. Of which angles the invention indeede (by the Chart especially) is very subtile, and consisteth herein (towith in knowing how much such kinde of angles doe decrease, or increase as the ship goeth forwards. And he that so shapeth his course, goeth the straight a nearest way. Otherwise it cannot be that a man fould keepea straight course, if he shal continually. follow one and the same point, or line of the Compaffe, (except hee fayle vnder a Meridian, or vnder the Equinoctiall line:) but hee must chaunge the poynte of the Compasse so often as that straight course shall seeme to require.

And therefore it cannot bee by any meanes that the Marriners, when they goe perpetually to wards the same part of the world, keeping the same angle of position in respect of the Meridian, or the same point of the Compasse; should goe the shortest and nearest way.

C This.

A correction of Embers

This kind of fayling vnder a great Citcle, is of especially le in our northerne Nanigations, for the discourry of the northeast or northwest passage a which as it may med rafily be performed by help of anthydrographicall globe with the helisphæricall lines drawne thereupon: lo forthe, that lift not be troubled with the comberfor carriage & charge of the globe, it may be done (in a manner) with no leffe facilitie by a nauticall planishare, made after the projection of Genme Frifine his aftrolabe, wherof more hereafter when God hal give leifure.

The expresfing of the rambes by right lines deerroncous.

There be some also that hold it for erroncous that to Chart houlde bee ckthe rumber in theor prefied by rightlines, and confequently that the mefended which ridians shoulde bee parallelles, or equidistant energy ome hold for where; which because it is but barely affirmed and the contrary may bee precised, as well as ther each sumbe except the tumbe of North and South maketh equall angles with enery meridian , we hold it not onely as true, but also as most meete and commodious for the Mariners common we that the meridians in the fea Chare faculd become where go quidifianticach from other, and confequently that the numbes thould be fraight lines for thefe causes First because the number for point the of the Comb salle may to moltcafily bee drawne in the paintigal Planisphære, onely by andreight ruler. For freing that any one and the fame tumbe (faming onely/the rumbe of North and South, which is all one with the Meridian) makethal wayes squall angles with cuery meridian, without exter lentible numerable, or menturable, though not without intelligible er-.vsw f.sout

in the Sea Chart.

rour (for indeede those angles are lesse and lesse as they come nearer to the pole, much like as the angle of a little semicircle is lesse then the angle of ag: cater semicircle) all the rumbes must needs be streight linessif the meridians be æquidiftant and right lines

by the 27 and 28 prop. I. Enclid.

Secondly the respective situation of any place to other in the Chart (which they commonly call the tying or bearing of one place from another according to the pointes of the Compasse) may most eafly be knowne by the nauticall Planifphære with right lined rumbes and equidiffant meridians. For that rumbe from which both places are ... quidiftant theweth howe those two places lye or beare one fro another about posters of substance of the auti-

And for these two causes of so great facilitie, both in the making, & ving of the mariners Charz with aquidiffant meridians, & streight-lined rumbes, it ought to be preferred before any other inftrument hererofore published to that ende for the common vie of the mariner, at fea especially. And though the globe be commended by fome as most absolute & perfect for all courses & climates whatfocuer: yet for the chargeablenes thereof, troublesome carriage, stowage and tedious vlage for the most part in nauigation, following any other course faue East or West, North or South: it will for the most part be found vnmeete and combersome, and nothing to fit and ready for the mariners common efe at fea as the nauticall planisphare trucky made.

-19 More the Remarks and the Canal Control Howe

24.00

A correction of Errors

chesteletasiantemplement decided at the Home

How the former errors may be anoyded.

nitrusting some ochap. 17 I.

Hescerrors notwithstanding they baue beene much complained of by diuetse, as namely by Martine Cortese in his third booke, and second chapter of the Arte of Nauigation, but specially by Petruc Na-

wise in his second booke of Geometricall observations rules and instruments : And although Gerardu Mercater in his vninerall Mappe of the worlde feemeth to correct them, by making the diffances of the paralels greater and greater towardes the poles: yet none of them reacheth any certains way how to amend such große faults, whereby the poore Mariner may be deceived many simes an whole point of the Compalle, yea fometimes two or three poynts and more, in judging by his ordinary Chart howe one place beareth from another; especially if he faile farre northwards, or fouthwards, whereby we may eafily gheffe, how indirect a course he shall make to come to the defired haven, that shall follow to false and erroneous direction with great danger (at the leaft) many times to loofe hippe goodes, lives and i un kine tertine kindi en medeski eret pe

The fountaine of all the errours aforefaide (the last onely excepted) is in the very foundation and groundworke of the Mariners Charte, that is, in the fast Geometricall lineaments thereof: namely, be-

cause

in the Sea Chart.

cause the meridians are not rightly divided, (the diuisions being every where equall:) nor the paralells rightly drawne (having in al places the fame diftances cache from other that the meridians have at the Equinoctiall:) Whereas the spaces betwixt the paralels shuld increase more and more as you go from the Equinoctiall towards either of the poles, which Martin Cortese also noteth in his 3 booke & 2 chapter of the Art of Nauigation. But he omitteth that wherein all the difficultie lieth, that is, how much, or in what proportion those spaces should increase. Which, that it may the bettet be perceived, I thinke it not vnmeete first to shew by what kinde of proiction (or extension rather) the nautical planisphere may not vafitly be conceined to bee geometrically made after this maner.

Suppose a spherical superficies with meridians, paralels, rumbes, and the whole hydrographical! description drawne thereupon to be inscribed into a

concaue cylinder, their axes agreeing in one.

Let this sphericall superficies swel like a bladder, (whiles it is in blowing) equally alwayes in cueric part thereof (that is as much in longitude as in latitude) till it apply, and soyne it selfe (round about, and all alongst also towardes either pole) vnto the concaue superficies of the cylinder: each paralel vpon this sphericall superficies increasing successively from the equinoctiall towardes eyther pole, vntil it come to bee of equall diameter with the cylinder, and consequently the meridians still widening them selues, til they come to be so far distant every where ech from other as they are at the Equinoctiall, Thus

(C. (C.)

A correction of Errors

it may nioft eafily be understoode, how a sphericall superficies may (by extension be made a cylindrical, and consequently a plaine paralellelogram supersicies, because the superficies of a cylinder is nothing elte but a plaine parallelogramme wownd about two equal aquidiffant circles that have one common axtree perpendicular vpon the centers of them both, and the peripheres of each of them equall to the length of the parallelogramme as the diffance berwixe those circles, or height of the cylinder is equal! to the breadth thereof. So as the nautical! planisphere may be defined to be nothing else but a parallelogramme made of the ipharical fuperficies of an Hydrographicall globe inferibed into a concaue cylinder, both their axes concurring in one; & on of the nau- the sphæricall superficies swelling in every partequally in longitude and latitude, till every one of the paralels therupon be inferibed into the cylinder (ech paralel growing as gree as the equinoctial or til the whole spherical superficies, touch and apply it selfe cutry where to the concavitie of the cylinder.

The definititicall planifphzre.

> In this nautical planisphere thus conceived to be made, al places must needes bee situate in the same longitudes, latitudes, and directions of courses, and vponthe lame meridians, paralels and rumbes that they were in the globe, because that at every poynt betweene the Equinoctial and the pole, wee vnderfland the sphærical superficies whereof this plantsphere is conceived to be made, to swell equally as much in longitude as in latitude (til it loyne it felfe voto the concaultie of the cylinder, to as heereby be part thereof is any way differred or displaced out of

in the Sea Chart.

als true and natural fituation ypon his meridian, paalel, or rumbe, but only dilated & enlarged the mecidians, also paralels, and rumbs dilating and enlarging themselves likewise, at every point of latitude

n the same proportion.

Now then let vs diligently consider of the Geooctrical lineaments, that is, the meridians, rumbs,
and paralels of this imaginary nauticall planisphere,
hat we may in like maner expresse the same in the
nariners Chart. For so vadoubtedly we shall have
herein a true hydrographical description of al plaies, in their longitudes, latitudes, and directions,
or respective fituations each from other according,
to the points of the Compasse in all things correspondent to the globe, without eyther sensible, or
explicable errour.

First therefore in this planisphere, because the paralels are every where equals ech to other (for every one of them is equal to the Equinoctial or circumfered of the circumferibing cylinder) the meridians also must needs be paralel & straight lines: & consequently the rumbs (making equal angles with every 27. Prop. 1. Euclid 17.

meridian) must likewisebe streight lines.

Secondly, bicause the spherical superficies whereof this planisphere is conceived to be made, swelleth in every part thereof equally, that is, as much in latitude, as in longitude, til it apply it selfe round about, to the concavitie of the cylinder: therefore at eneric point of latitude in this planisphere, a part of the meridian, kepoth the same proportion to the like part of the paralel, that the like parts of the meridian, and paralel have each to other in the globe, without explicable error.

Now

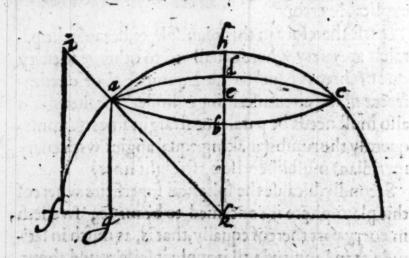
Nowe because like partes of wholes keepe the same proportion that their wholes have therefore the like partes of any paralell, and meridian of the globe have the same proportion that the same paralell and meridian have,

For example fake, as the meridian is double to the paralell of 60, degrees, so a degree of the meridian is double to a degree of that paralell, or a minute to a minute &c. and what proportion the paralell hath to the meridian, the same proportion have their idiameters and semidiameters each to other.

Rapp.l. 5.11. 69 26.18.c. 2.e. 15. Rami.

But the fine of the complement of the paralels latitude, or distance from the equinoctiall,, is the se-

midiameter of the paralell.



As here you see, so the sine of ab the complement of af the latitude or distance of the paralell abcd, from the Equinoctiall, is the semidiameter of the same paralell abcd.

And as the semidiameter of the meridian (or the

in the Sea Chart.

whole fine (is to the semidiameter of the parallel, so is the Secans, or Hypotenesa of the parallels latitude (or of the parallels distance from the æquinoctials) to the semidiameter of the meridian, or to the whole sine; as fk (that is) ak, to ac (that

is) gk; fo is ik, to kf.

Therefor in his nauticall planisphære, the semidiameter of each parallel being æquall to the semidiameter of the æquinoctiall (that is) to the whole sinesthe parts of the meridian at every poynt of latitude must needs increase with the same proportion wherewith the Secantes or hypotenusæ of the arke, intercepted betweene those pointes of latitude and the æquinoctiall do increase.

Now then wee have an easie way layde open for the making of a table (by help of the Canon of Triangles) whereby the meridians of the Mariners Chart may most easily and truely be divided into parts, in due proportion from the aquinocaill to-

wards either pole.

For (supposing each distance of each poynt of latitude, or of each parallel from other, to containe so many parts as the Secans of the latitude of each poynt or parallel containeth) by perpetuall addition of the Secantes answerable to the latitudes of each point or parellel vnto the summe compounded of all the sormer secantes; beginning with the secans of the suff parallels latitude, and thereto adding the secans of the second parallels latitude, and to the summe of both these adioyning the secans of the third parallels latitude, as so forth in all therest, we may make a table which shall show the sections and points

points of latinude in the meridians of the nautical planisphere: by which sections, the parallels are to be drawne.

As in the table following, we make the distance of each parallel from other, to be one minute: and wee suppose the space betweene any two parellels each next to other in the planssphære to containe so many parts as the secans answerable to the distance of the furthest of those parallels fro the aquinoctial: and so by perpetuall addition of the secans of each minute to the summe compounded of all the

whole tpherical superficies, touch and apply it selfe cuery where to the concauitie of the cylinder.

In this nautical plantiphere thus conceived to be made, al places must needes bee situate in the same longuades, latitudes, and directions or courses, and vpon the tame meridians, paralels and numbes that they were in the globe, because that at every poyne betweene the Equinoctial and the pole, wee vnder-stand the sphærical superficies whereof this plantishare is conceived to be made, to swell equally as much in long itside as in latitude (til it ioyne it selfe voto the concaultie of the cylinder, so as heereby no part thereof is any way distorted or displaced out of

in the Sea Chart.

this table it was thought sufficient to vse such exactnesses that thereby (in drawing the lineaments of the nauticall plantsphere) sensible errour might be anoyded. He that listeth to be more precise may make the like table to decades or tennes of seconds out of seachimus Rheticus his Canon magnus triangulorum. Notwithstanding the Geometrician that desireth exact trueth, cannot be so satisfied neither, for whose sake and surther satisfaction, I thought it not vnmeete to adiounce also this Geometricall conceit of dividing a meridian of the nauticall planse

ferece of the circumteriolog cynnast, the metalians also must needs be paralel se straight lines. & confequently the rumbs (making equal angles with every Euclid 17 meridian) must likewise be streight lines.

Secondly, bicaule the laberical superficies whereof this plantiphere is conceived to be made, fwelleth in every part thereof equally, that is, as much in lititude, as in longitude, til it apply it felfe round about, to the concentric of the cylinder: therefore at enerie point of latitude in this plantiphere, a part of the me sidium, kepeth the same proportion to the like part of the paralel, that the like parts of the meridian and paralel have each to other in the globe, without explicable error.

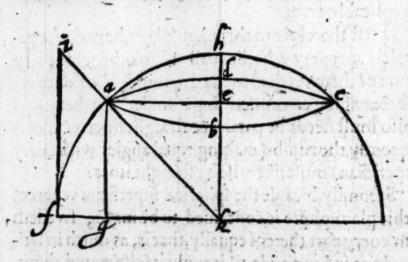
Now

Nowe because like partes of wholes keepe the same proportion that their wholes have therefore the like partes of any paralell, and meridian of the globe have the same proportion that the same paralell and meridian have.

For example take, as the meridian is double to the paralell of 60, degrees, so a degree of the meridian is double to a degree of that paralell, or a minute to a minute &c. and what proportion the paralell hath to the meridian, the same proportion have their diameters and semidiameters each to other. Rapp. 1.5.11. 6 26.18.c. 2.e. 15. Rami.

But the fine of the complement of the paralels latitude, or distance from the equinoctiall,, is the se-

midiameter of the paralell.



As here you see, so the sine of sh the complement of sf the latitude or distance of the paralell abcd, from the Equinoctiall, is the semidiameter of the same paralell abcd.

And as the semidiameter of the meridian (or the

in the Sea Chart.

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Now then wee haur an easie way layde open for the making of a table (by help of the Canon of Triangles) whereby the meridians of the Mariners Chart may most easily and truely be divided into pasts, in due proportion from the equinoctial to-

wards either pole.

For (supposing each distance of each poynt of britishe, or of each parallel from other, to containe to many parallel each and of the latitude of each poynt to parallel containeth) by perpetuall addition of the Secantes answerable to the latitudes of each point or parellel vinto the summe compounded of all the some recentles of beginning with the secand distributed of the further parallels latitude, and thereto adding alles each of the secand parallels latitude, and to the summer of both these adiouning the secans of the third parallels latitude, as so forth in all therest, we may make a table which shall show the sections and and a table which shall show the sections and

points of latitude in the meridians of the nautical planisphere: by which sections, the parallels are to be drawne.

As in the table following, we make the distance of each parallel from other, to be one minute: and wee suppose the space betweene any two patellels each next to other in the planisphare to containe so many parts as the iccans answerable to the distance of the furthest of those parallels fro the aquinoctial : and so by perpetuall addition of the secans of each minute to the fumme compounded of all the tormer secantes I make the whole table. As for example, the lecans of one minute is to, 000,000. which also shewerh the section of one minute of the miridian from the aguinoctiall in the nauticall planisphære. Whereunto adde the secans of 2, minutes, that is 10,000,002, the filme is 20,000,002. which theweth the lection of the fecond minute of the meridian from the aquinoctial in the planisphære: to this summe adde the scrans of 3.minutes, which is 10,000,004, the fumme will be 30,000, ood, which floweth the fection of thethird min. of the meridian from the aquinodial: and forforth in all the reft: faming that in this table wee have of purpole omitted in every fecans the 3 first ciphers next the right hand : not onely for the eafier, but allo for the mucr making of the table, because that indeedear every poynt of latitude, a mini of the meridian in this nauticall plantiphare, bath fomereliat leffe proportion to a minute of the parallel adioyning towardes the acquinoctial, then the lectus of that parallels latitude hath to the whole line, Butin

in the Sea Chart.

this table it was thought sufficient to vie fuch exactnesse as that thereby (in drawing the lineaments of the nauticall planisphere) sensible errour might be anoyded. He that lifteth to be more precise may make the like table to decades or tennes of feconds out of leachimus Rhaticus his Canon magnus triangulorum. Notwithstanding the Geometrician that defireth exact trueth, cannot be fo fatisfied neither. for whole take and further fatisfaction, I thought it not vnmecte to adiovne also this Geometrical conceit of dividing a meridian of the nauticall plant-

fphere.

Let the zquinoctiall and a meridian be drawne vpon a Globe: Let the meridian (divided into degrees, minutes seconds, &cc.) roule vpon a streight line beginning at the zquinoctial, the Globeswelling in such fort as the semidiameter thereof may be alwayes squall to the fecans of the angle, or arch consciped betweene the equinoctial and lemidiamerer infifting anxight angles voon the forelayde freight line, The degrees min. lec. &c. of the meridia noted in the streight line as they come to touch the lame, are the dipilions of the metidian in the nautical planishere. And this conceit of dividing the meridian of the nauticall planisphere may latisfie the outions exactnelle of the Geometrician: but for mechanicall vicathe table before mencioned which hereafter followeth may fuffice.

Till the Printer had thus farre proceeded J wiss purpased to have published the whole Table before mencioned in such fort as I had made it , (sipposing a Meridian of the nauticall Planisphere to be divided, beginning at theequinostiat) into fach parts whereof a minute of the aguinoctial containeth 10, 000. and fetting downe by which of these parts enerie minute of latitude is to be drawne, till you come within a minute of the Pole.

But part arther adaicers men thought more meet to abridge the fame as followeth, to earry tenth minute, & to cut off throughout the Table the three first figures towards the right hand, meaning not at this time to trouble thee mid homeir them many by be of ufe, for the true dividing of the Meridian in the Sea Chart into deprees, and first parts of a decrees without fenfible error which may be fufficient for the greatest fort of Sea Charts or M apsithus hithertahand beene commonly ofedi

This Table is dissided intotroctobarines afferenfthe first contained degrees; and connecof minutes; of the Meridian of the nauticall plantiphace beginning at the equinostial. The fecond columns containeth equal parts unabe famos as contian a beatinging likewife by benimb the dismather against the legal which plan bear you mate anthumpimatistico uniterfluoderesantumes de prived the week booking my of the je pasts are an free rable to ony deres in Desalts of minutes of latitude in the manticall but for mechanical right address mountained

which hereafter followeth may luffice.

The vie hereof followeth after the Table.

A Fable for the true dividing

[Col. 2 (d.)	11. Col. 2. Col.	1 Cal. 2 Cal.
De Me	De Mi	De Mi
0110 0100	5 110 3104	10 10 6132
20 200	5 20 3205	10 20 6234
300 300	5 30 3305	10 30 6335
0040 CHOO	5 401 3405	10 40 6437
07501 300	\$ 50 3506	10 50 6539
19/10 1 0,602.	6 80 3606	11 0 6641
1 10 0700	6 10 3707	14 10 6743
28 30 6800	6 201 3808	11 20 6845
1030 000	6 130 3908	11 30 6947
11/40/ 0000	6 401 4009	11 40 7049
1 20 1100	6 50 4110	12 0 7257
2 8 6 1200	7 7 0 4210	
2+10 1300	7 10 4311	12 10 7355
20 1400	7 20 4413	12 30 7560
2 30 1500	7 40 4514	12 40 7662
	7 50 4715	12 50 7765
- 1 - 000	8 0 4815	13 0 7868
3 10 0001	8 10 4916	13 10 7970
3 20 000	8 20 9018	13 20 8073
3 180 2101	8 30 5119	13 30 8176
2 40 2201	8 40 5220	13 40 8279
3 30 2300	8 50 5321	13 10 8382
4 0 0400	9 20 3422	14 0 8485
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4 20 3602	9 20 5625	
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4 50 2903	9 50 5929	15 0 9104
\$ 80 300g	1000 6030	E

of the meridians in the sea Chart.

1. Col. 1 2. Col.	11. Col 2 Col	11 Col 1 21 Col.
De Mi	De Mi	De Ms
LS 10 9208	20 10 12358	2010 13510
15 20 9312	20 20 12464	25 20 15721
15 30 9415	20,30, 12578	25 30 15832
15 40 9519	2040 12578	25/40 13/942
15 50 9623	20,50 12785	25 50 16053
16 0 9727	21 0 12892	26 0 16169
16 10 9831	21 10 12999	26 10 16276
16 20 9935	21 20 13103	26 20 18388
16,30, 10039	21130 13213	16 30 16499
16 40 10144	21 40 13321	26 40 16611
16 50 10248	21 50 23429	26 50 16723
17 0 10353	12 0 13537	27,0 16835
17 10 10457	22 10 13645	27/10 16947
17 20 10562	22 20 13753	27 20 17060
17 30 10667	22 30 13861	27 30 17173
17 40 10772	22 40 13969	27 40 17285
17/50 10877	22 50 14078	27/10 17398
18 0 10982	23 0 14186	2880 17513
18 10 11087	23 10 14295	28/10/ 17625
18 20 11192	23 20 14404	28:20 17738
18 30 11298	23 30 14513	28130 17852
18 40 11403	2340 14622	1840 17966
18150 10509	23 50 1473 E	28/50 18080
19 0 11615	24 0 14840	29 0 18194
10 10 11720	24 10 14950	29 10 18309
1920 11826	24 20 15050	29 20 1842 2
1030 109301	24 30 19170	29 30 18538
043 120381	2440 15280	290 40 18653
950 120+5	24 50 15390	29 30 18768
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1.664 2 2641	1 Coll = 2 Col 1	1 Col 2 Col
De Mi phopa	De Mi	De Mi
30 10 18999	35(10) 22569?	40 16 26358
30 20 19115	35 20 22688	40 20 26489
30 30 19231	35 30 228117	40 30 26621
040 19347	35 40 22934	40 40 26752
0 50 19464	35 50 23057	40 50 26884.
1 0 19580	36 0 23180	41 0 27017
1 10 1 19697	36 10 23304	41 10 27149
1 20 4198142	36 20 8 23428	41 20 27282
1 20 1 1 993 17	36 30 23552	41 30 27416
1140 20048	36 40 23677	41 40 27549
8 904 × 20166	36 50 23802	41 50 27683
2 0 20284	37 0 23927	42 0 27818
3 110 120402	37 10 24052	42 10 27953
2 20 2000	37 20 24178	42 20 28088
2 30 20639	37 30 24304	42 30 28223
240 420757	37 40 24430	42 40 28359
2 50 20876	37 50 24556	42 50 28495
3 0 20995	38 0 24683	43 0 28632
3 10 21115	38 10 24810	43 10 28769
3 20 21234	38 20 24938	43 20 28906
3 30 12 1354	38 30 25065	43 30 29044
3 40 2 474	38 40 25 193	43140 29182
3 50 2 1394	38 30 25321	43 50 29320
4 0 21715	29 0 25450	44 10 29598
4 10 12 1836	19 10 25579	
4 20 21957	39 20 25708	44 30 29738
4 30 22078	39 30 225837	44 40 30018
4 40 22199	39 40 12 1967	44 50 30159
34 50 -22321	39 50 26007	
35 0 +23443	40 0 26228	E 2

of the meridians in the sea Chart.

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45 10 30442	50 20 35058	55/20/140032
45 20 30584 45 30 30726	50 30 35215	55 30 140208
15 40 30869	50 40 35373	55 40 1 40385
45 50 31013	50 50 -35531	5.5 50 40563
46 0 31156	54 10 235690	56 0 40741
16 10 31301	51 10 35849	56 10 140921
16 20 31445	51 20 36009	56 20 1411018
16 30 31590	51 30 36 t69	56 30 141282
46 40 31736	51 40 36330	56 40 41463
46 50 31882	51 50 36491	56,50 41646
47 0 32028	52 0 26654	57 0 41829
47 10 32175	52 10 36816	57 10 042013
47 20 32322	52 20 3000	57 20 42198
47 30 32470	52 30 37144	57 30 42384
47 40 32618	52 40 37808	5740 42370
47 50 32767	52 50 37473	58 0 42758
48 0 32916	53 0 37639	58 10 243135
48 10 33066	53 20 237905	58 20 243325
18/20 33216	Commence of the Commence of th	58 30 43516
48 40 5 33 418	THE RESIDENCE OF STREET, STREE	58 40 43708
48 90 : 33670		58/50 43001
49 6 33823	54 0 38648	5910 044099
19 10 33975	5410 -38819	59 10 44389
49 20 34128	54 20 23 8990	59 20 04 448 9
49 30 234282	54 30 39162	591301 04468 IA
19 40 34436	5449 239384	19 40 44879
49 50 34591		59,50 045078
50 0 34746	55 0 39682	691 01:45377

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O 120 45478	5110 52030	70 10 59960
60 29 41679	05 29 52269	70 20 60257
6080 145887	951301 52540	70130 60555
50,40 46081	95449 52752	10 40 60856
50 50 46290	05 50 529950	70/50/ 61159
51 0 46496	66 10 83241	711 0 61465
	65 10 53487	71010 61774
51 10 1467930	56,20 337361	71 20 62085
5129 1469KI	66,30 339861	71/30 62399
1130 147 620	66 40 54237	71 40 62716
47330	66 50 54491	71150 63035
91,50 475410	67 0 54746	72 0 63357
62 0 47754 53140 47962	07 10 55003 C	72/10/2530827
62 20 48182	67 20 55 5262	72/20 64011
62 30 48398	67 30 : 55822:	72 30 064342
62 40 48 E46	67 40 55784	72 40 064676
62 50 48834	67 50 56049	72150 05014
635 Q 49Q548	08 Q 56311	73 0 05354
03 10 49875	08,10006583	73 40 43698
6330 494978	08 20 -56853	73 20 66045
63 30 49700	68180 67124	the second secon
63 40 49945	68 40 57398	73 40 66750
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64 10 010628	69 301 58933	74110 67833
64 20 - 508480	6920 518515	74 20 168202
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of the meridians in the few Chart.

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I Col. 2 Col.)	1 Cor 1 2 Cos 7	1. Con 3 CON
De Mis	De Mi in ou	De Mi all
75 10 70104	80 40 84394	85410 108865
75 20 70497	80/20 84945	85950 110075
751300 70894	80730 85 546°	85530 111328
75 40 71290	80f45 86F58	85146 112636
75 50 71703	80,50 86781	85950 113982
76 0 721141	811 6 87415	86 00115389
76 10 72530	8170 88661	86,10 116856
76 20 729511	8170 88769	86 20 41 8389
76 30 -73 3771	8190 89 890	
76 40 738081	8140 000710	86 40 121675
76 50 74245	81 50 900710	86/50/123444
77 0 74687	82 10 01483	87 10 125200
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77 20 75 588 2	82 30 792942	87 20 129272
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77 50 76984	82 50 95280	87150 136437
78 797461	83 0 960918	88 0 13000
78 10 77947 8	83 F10 96923	88116 +42265
78 20 78438	83 20 97775	88 20 145407
78 30 78937	83130 798648	88/30 149139
78 40 79442	83 40 99544	88 40 153913
78 50 79955	83 50 T00454	88/50/15/834
79 0 80476	84 0 101409	89 6 16 176
9 10 81004	84 10 102380	89 10 169301
9 20 81 741	34 20 103980	39 20 177259
9 80 82 085	84 30 104400	89 30 187284
940 82639	84 400 00 547 10	89 40 2019113
9 50 83201	84150 206565	89 30 226223
80 0 83773	85 0 107696	90 0 Infinite

The Fashe farmer Table.

THe vic of this making the fea Chart, is s this : questhy are the midft of the plaine superficies, whereuppon you will draw the lineaments of the Chart, deferibe a night lipe, of representing the equino anallisisele) which you hall divide into 360 parts pricegrous, and crofle the fame fquirewife with right lines, by enery fift of tenth degree. Then take with your compasses the length of half the capinodists (thatise 180 degrees) and fetting one fonte objour compaffes in the mutuall interfeation of the equinoctiall, with the perpendicular bemeridian that palleth by enther end of the equinoctiall, with the other foot make a pricke in the same perpendicular or meridian: the space contained betwitze this pricke and the equinoctial, divide firstions three equal parts and cueric one of these incogether abreedo haus you nine in all: and again cuery one of thele into three for haucy ou 27 ports, and enerte and infrihely parts divide into foure, fo haneyou 108 parts : And againe (if there bee space inough) diluide eucric one of thele into 10 or 100. so hally ou have 1080, or 10800 parts. Then note enerie filpand tersh part with blacke lead, and fet figures as thom, beginning at the equipoctiall, and from thence proceeding northwardes and fouth, wardes Then looke what numbers Itand oueragainfleach degree in this Table (omitting alwaics rand or timb of the first figures stawardes the right thand) and at the fame numbers of pasts in the perpendiculars is make prickes on pithor fide the equinochiall by which (pricks) draw right lines equidiffant from the equipostially for they hall be the parallels away

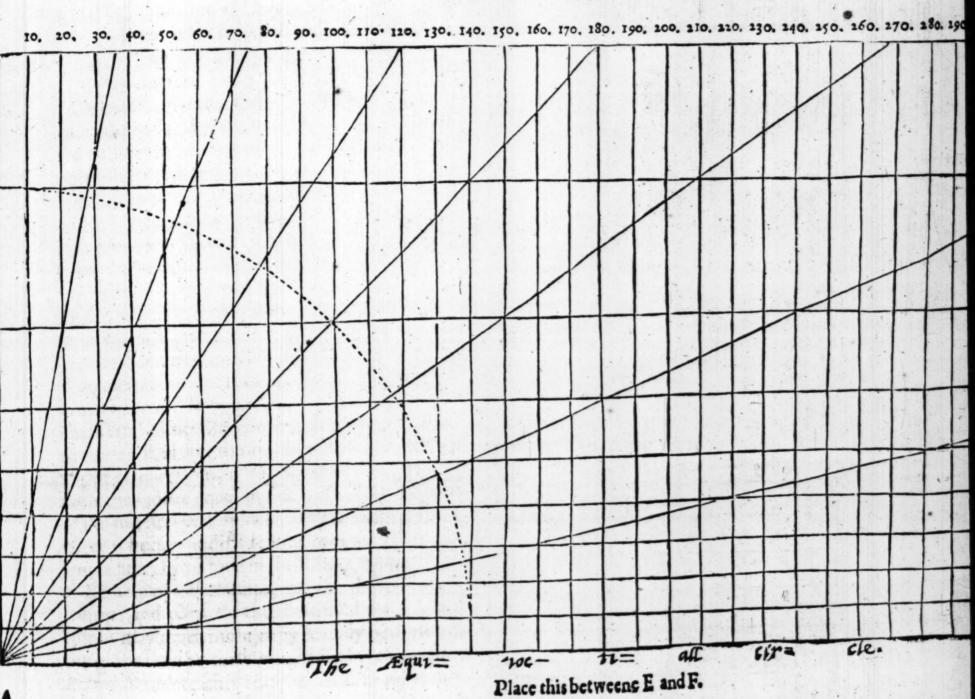
The se of the former Table.

parallels of the hautical Planishaid to alvell'T

Notwithstanding these parallels at east of them a little further distant from the aquinoctials then in truethelies should be a and to much the more, the further they are from the equinoctials. Which cretor might be something the lesse; if the former Table had beenedisk made to smaller parteraken minutes. But that were a matter more curious then necessare, the table here before set downe being so make the truch, that it is not possible by any cutes or instruments of natigation to discour any long-ble error in the sea Chart, so fatte sooth as it shall be made according thereto: the output of the season and the seaso

The figure following containeth onely one part of the nautical Planisphere, from the equipodiall northwardes, because the other part from the equinoctiall fourthwardes is alregether like to this. Herein first drawethe aguinoctial A C. and diuide it into 360 degrees, drawing perpendiculars from enerie tenth degree thereof, which that beahe meridiane cuerie where equidiffant each from other. Then take halfe the length of the equinoctial with your compalles, and fetting one loote in the ende of the equinoctiall ar C with the other foote make a pricke at D in the perpendicular or meridian CD. The frace contained betwirt Cland Didiunded into 1080 partes in fuch fort as before bath beene flewed and fer figures to them, as hooreyou fee, that you may the most readily number those parts. Then looke in the former table what number answereth to eneric tenth degree, and cuffing away

The draught of the Meridians, Parallels, and Rumbes of the nautical Planssphære truely made.



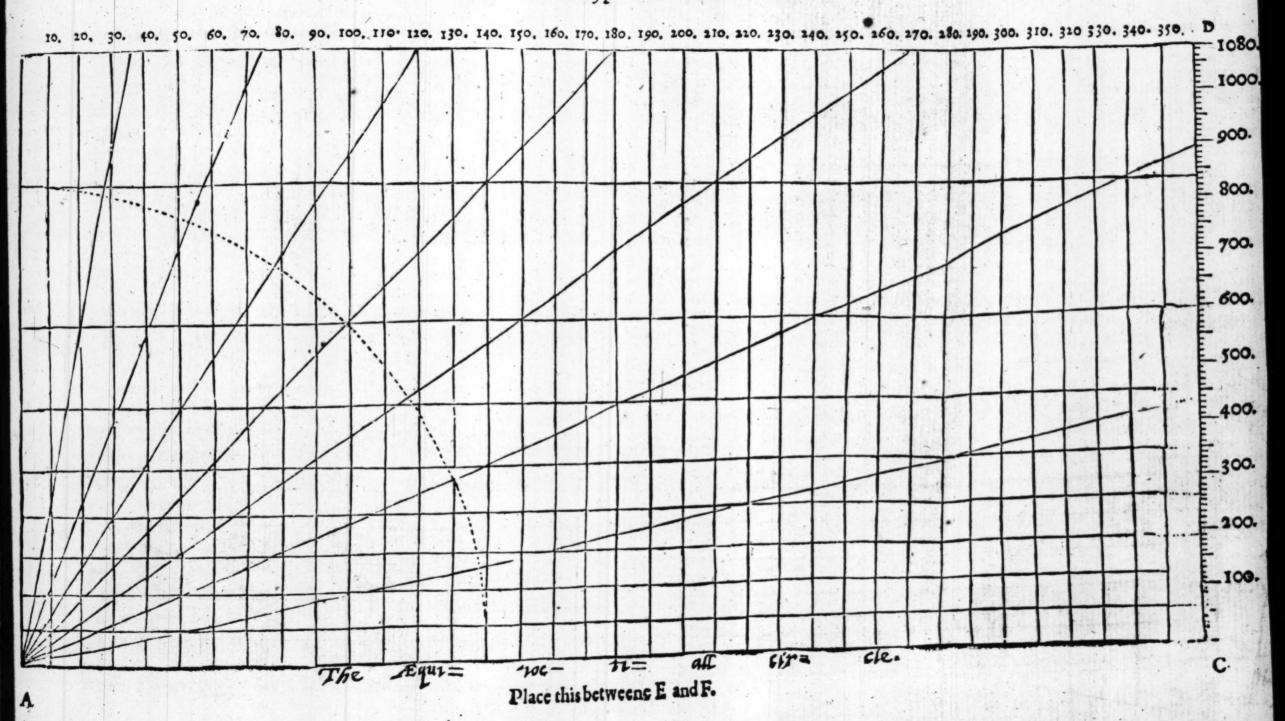
the former Table.

call Planisphare, looks HT hele parallels are all of them a from the zquinoctiall then in : and to much the more, the the equinoctiall. Whicheshing the leffe, if the former Tanade to fmaller partes then miere a matter more curious then here before let downe being lo tit is not possible by any cules uigacion, to discouer any sensi-Chare, le farre foorth as it wall bigamin

faune perne

ving containeth onely one part nisphære, from the equinodiall fe the other part from the equies is alrogether like to this. the aquinoctial A C. and digrees, drawing perpendiculars egree thereof, which that be the where equidistant each from o fe the length of the equinoctial es, and fetring one foote in the ctiall at C with the other foote in the perpendicular or meridicontained betwixt C and D. direes, in such fort as before bath fer figures to them, as hocreyou he more readily number those in the former table what numacrie centh degree, and (caffing away

The draught of the Meridians, Parallels, and Rumbes of the nautical Planssphære truely made.



Mark. Place Harlet

finde out the parts answerable to the numbers remaining in the line C. D. and at those parts make prickes, by which you shall drawe the parallels.

As for example: in the table, the number oueragainst 10 degrees, is 60 (casting away the twoo first figures towardes the right hande) therefore I looke 60 in the line CD. and by that part I drawe the parallel of 10 degrees distance from the æquinoctiall. And after this manner I draw all the rest,

as you may fee in the former draught, in

Now because the nauticall Planisphære (as before hath been (newed) is nothing else but a plaine parallelogramme superficies made by extension of a sphæricall superficies inscribed into a concane cylinder, wherein therembes, or lines of the Compasse make equal angles with euerie meridian: therefore in this nauttcall planisphære if a circle be drawne and divided into 32. equall partes, beginning at the meridian passing by the centre of that circle: right lines drawne from the centre by those divisions shall bee the rumbes or lines which the fhippe describeth in layling vpon those poynts, because they make equal angles with euery meridian of the nautical planisphære, those meridians being cuery where aquidiffant one from an other. Example hereof you have in the former figure.

By help of this planishare with the meridians, rumbes, and parallels thus described thereing the rumbs may much more easily & truly be drawn in the globe then by these machanical wayes which Petrus Nonjus reacheth gsp. 26 lib. 2. de obser. Reg.

lesse seem. Heereby also they may with no hesse tacility be inscribed into any other Chart or mappe of what forme or projection so ever, if it be first divided by degrees meridians and parallels into degrees of longitude and latitude. For by what poynts of longitude and latitude in this planishment the rumbes are described, by the same poyntes must they be drawen in the globe, or in any other Chart or mappe what soever. Not withstanding this may much more exactly bee performed by the table of rumbes following, which I have made for that purpose, shewing for every degree of longitude, by what degree and minute of latitude every rumbe is to be drawen til you come

within a minute of the pole

This Table of rumbes is most easily made by addition only with helpe of the table before mentioned thewing (for enery minute from the equinoctiall to the pole wanting onely but 1.min.next the pole) how the meridians or degrees of laritude in the nauticall planisphere are to be divided, after this manner : multiplie the Tangens of the angle that the rumb maketh with the equinoctial by 60 (because every degree of the aquinoctial in that table is vader food to containe 60 simes 10000 parts, each min conteining (by Supposition) 10000 partes:) the product shall be the first number at the beginning of each table of each rumbe, tobce fet ouer against one degree of longitude, and all the rest are found by perperual addition of this number, first to it selfe (for the summe is the numher answerable to two degrees of longitude) then

for this fundme; (the product is the number that are five each to 3 degrees of longitude) and so forth in all the rest. These numbers being found out in the table before mentioned, did shew at what minute of latitude each rumbe sheuld crosse the meridian for every degree of longitude. But these numbers were not thought needfull to bee expressed in the table following, because they serve only for the sinder they which the rumbers and minutes of latitude (by which the rumbers must be drawne) which being once found, these numbers serve to no turn there wie.

The speciall vie of this table is for the true dra wing of the tumbes in the globe and the Charts which fome call paradoxal abut to speake plane english, it is nothing else but a Chart, whose center is the pole, and may best be made after the kind of projection vied by. Gemma Frifiamin his Attrolabe: wherein the meridians will be right lines passing by the center, and the parallels periohel cies of a circle: supposing one halfe of the iphæs ricall superficies of the terrestriall globe to be proisched into the plaine of the zquinoctiall; Whole principall wie may be in our northerly navigatios & discourries, wherein the drawing of the rumbes may most easily and exactly enough be performed by helpe of this table following thus : having an Index hanged ypon the center and graduated with degrees of lasitude, with figures levito enery fifth or tenth beginning at the æquimo Cial: hauing alfo divided the equinoctiall into degrees of longitude, beginning at the first meridian, laye the Inder

dex to every degree of longitude in order lone after another, looking alwaies withall in this Table the latitudes of the rumbe you desire to describe, and at the same latitudes found in the fiducial line of the index, make pricks in the Chart, for by these prickes the helisphæticall line or rumbe desired must be drawne.

After the same maner altogither must you work with the Globe having first truely hanged it upon his poles within the meridian divided into degrees, and subdivided also into smaller parts (if roume will serve) with numbers set to every fifth, or tenth degree from the aquinoctiall to the Pole, and then proceeding in all poynts as before; with the Chart, onely ving the Meridian in seede of the index.

described in those distorted hart-formed maps of orentine and repelies, in any other forme amongst Prolone, and Ortelias his Geographical Tables, of any else whatsoever, so it be first distinguished by meridians and parrallels; shewing the longitude and latitude of any poynt assigned therein is seeing it may casely be knowneout of this Table by what poynts of longitude and latitude each rumbe must passe from the aquinostial to the Pole almost. But those two kinds of projection before mentioned, I meane of the natical Plansiphere, and Gennis Fristischis Astrolaise are such as of all others do best represent in a plaine the true formes of all places that are upon the Sphærical face of the earth.

tude, organing at the first mer han, laye the ln-

The first rumbe from the Equinottiall.

The rumbe of Seast and by North, East and by South: West and by North, West and by South.													
Lon.	Latitu-										Lon,	La	teta
	De.Mi		- 1	De:Ms							Deg	De.	Mi
	o H	31676	-11	12 2				121			151		
2	1		11 -	12 14		17		122			152	128	55
-	0 35	33 5 33		12 25	100000			123	1 -	45	153		
	0 47	346 44	64	12 37	1		22	124		55	1	A selection	10
	1 0	35 5 50	11 11 11	12 49		13		125			155	1	20
	1 12	36 7	8 66	13 0	-	18	-	126		_	156	-	
7			1	13 12			-			28	157	1	
8	1 35		-11 =	13 24	1	-	7	128			159	_	57
	I 47		"	113 35			-	129		5C	160		18
10	-	Annual Control of the last of	-	13 47		-		131		12	161	-	
H	1		11	13 58		1		132			162		
-	23			14 22		-	3	133	_	3:3	163	Stated St.	
13		11 10	11 -	14 33	1	12.00	-	134		44	164		55
	12 47 5 2 59			14 45		-		135	-	55	165	31	1.5
	53, 11		5 76	14 56	106		37	136		5	166	-	Is
17		1	_ 11	119 8	107	20	48	137	26	16	167	1	2
	8 3 34	11	11 /7	315 19	108			138			168		40
-	9 3 46		2 79		10 -1-	2.		139			169		59
	58		3 30	15 42		-	22	140			170		-
I	14 10	5110	5 81	1.	11	1174	33	141	-		11	12	20
-	2 4 22		-	2 16 5		-	41	1	_	20	173		31
	3 4 34		- 11 -	3 16 17			55	143		30 00	174	32	4
24	44 46		- 1	1 16 28	115	133		144		-	175		50
	54 58	5510 5	11 0	5 16 40	116	22		146	27		11		,
-	615 7 9				117	22	39	147	28	-2	177	133	L
	75 21		11 01	7 17 2	118	22	50	148	28	13	175	22	2
	8 5 33	No.		9 17 25	119	2-3	1	149	28	23	175	133	3
D	95 45		- 11	017 37	120	33	12	150	28	34	180		4
3,	015 57	001	-	1-7				TF	3		1.	-	1

The first rumbe from the Equinottiall.

The weeks	SEast and by North, East and by South: West and by North, West and by South.	-
The Immae	West and by North, West and by South.	

In Lateral		Lan' Intitu!		Lon. Latitu.	Lon Latitu.
Deg De.Mi	Deci De Mi	Dea De Me	Deo De. Mi	Deg De.Mi.	Dee De Mi.
1813; 50	2.11.8.20	24142 6	271 17 21	301 51 14	331 54 49
1		242 +3 18	275 17 29	302 51 22	332 54 56
183 34 10			273 47 37		333 55 3
184 34 20				304 51 37	
		Separation to the separation of the separation o	1	305 51 44	The second of the second of the second
1 1 - 1	216 39 25		275 18 1		336 55 23
Character of the second of the	217 39 34		277 48 9	307 51 59	337 55 30
188 34 59		248 44 9	278 +8 17	Committee of the Party of the P	338 55 37
	219 39 53			309 52 13	
19035 19	The second of th			310 52 21	
	221 40 11			311 52 28	
	The same of the same of the same of			312 52 35	
	223 10 29			313 52 42	
	224 40 38			314 52 50	
				315 52 57	11
196 36 26		256 \$5 17			
		25815 24	288 10 25	317 53 II 318 53 18	34750 37
19026 45	22011 22	25015 42	28010 42	31953 25	140 56 50
200 36 55		260 45 51			350 56 56
Control of the Contro	The same of the same of	261,45 59			35157.3
Law Inches	232 11 50			322 53 47	3-52 57 5
100000000000000000000000000000000000000	-		293 50 14	323 53 54	353 57 16
1	234 12 8	264 16 24	294 50 21	32154 1	354 57 22
205 37 42	235 42 10	265 16 32	205 50 20	225 54 8	255 67 20
206 37 52	1230 42 29	200 46 40	296 50 37	326 54 15	256 37 35
207 38 1	1237 42 34	1207 46 48	207 50 44	227 84 77	12 53 50 00
150639 11	1230 42 43	1 208 40 57	129850 52	328 54 20	258 57 18
1209 38 20	123942 52	1260 17 5	200 50 50	220 54 196	250/27 2
210/50 29	240,43	2/0147 13	300 51 7	33054 42	360 38 I
	4	1		111	

The first rumbe from the Equinoctiall.

The minte of	East and by North,	East and by Scuth:
I WE LAMAGE OF \$	West and by North	tast and by South: West and by South.

Lon.	Laturu.	Lin.	Launa.	Lon.	LA	tun.	Len	L	tuu.	Lon	L	aur	Les	1.1.	0.111
Deg	De.Mi	Deg	De.Ms.	Deg	De.	Mi.	Deg	De	Mi.	Deg	1)0	Mi	196	120	M
	58 7 58 13		51 13							121					
	58 19	-	61 19	-	64	-			- 12. Tan 1	123	_	-	- entries - remain		-
- 1	58 26	11	61 25		64	-	94	66	37	124	68	53	154	70	5
	58 32 58 38		51 31 16 36				95	56	42	125	58	57		70	
7	58 44	37	61 42	67	54	24	97	66	52	127	59	6	157	71	
-	58 50	-	61 48				-			128				-	I
_	59 3	1	61 59			- 1				130				4	
	59 15	1	62 4 52 10							131					2
13	59 21 59 27	43	62 16 52 21	73	64	55	103	67	19	133	69	31	163	71	30
15	59 33	45	62 27	75	55	5	105	57	29	135	69	39	165	71	
100	59 39	The Market Contract of the Con	62 32		-	-	4	N. Com.				-	The second second		
	59 45	0	62.43							137 128					45
19	59 57	49	52 49 62 54	79	65	25	109	67	47	139	09	56	169	71	5
21	The state of the s	510	62 59	81	05	35	111	57	56	141	70	4	-	72	50
23	60 21	.53	63, 10	83	65	44	113	68	35	143	70	12	173	7.2	7
	50 27		63 16	ACCORDING TO SECOND	_	-		-			-	-			15
			53 26												18
	50 44									147					25
THE R. P. LEWIS CO., LANSING, MICH.	50 56	THE RESERVE TO A SECOND		-	_			20		149					
	SE: 2	60								150					33

The first rumbe from the Equinodiall.

The rumbe of	SEast and by	North,	Eastand	lby Son	uth:
	West and b	North,	Vest and	by Som	th.
tu. Lon Latits	Lon Late	tw. Lon.	Latitu.	Lon.	Latit

on. Latitu.	Ton	Latitu	Lon	Lat	uu.	Lon.	La	titu.	Lon.	L	titu.	Lon	La	etits
Des De Mi.	De	De.Mi.	Dee	De.	Mi	Deg	De.	Mi	Deg	De	Mi.	Deg	De.	M
81 72 36	211	74 18	241	175	50	271	77							
182 72 40	2 . 2	74 21	242	75	53	272	77	16	302	78	31	332	79	3
183 72 43	212	74 24	24:	75	56	273	77	19	303	78	33	1333	79	4
184 72 47	214	74 28	244	75	59	274	77	21	104	78	36	334	79	4
185/12 50	215	74 31	245	76	2	275	77	24	305	78	38	335	79	4
186 72 54	216	174 34	246	76	5	276	177	26	306	78	40	1330	79	47
187 72 57	217	74 37	247	76	7	277	77	29	307	78	43	337	79	45
138 73 1	218	74 40	248	76	IC	278	77	32	308	78	45	338	79	5
189 73 4	217	74 44	249	76	13	279	77	34	309	78	47	339	79	5
190 73 8	220	74 47	250	176	16	280	177	37	310	78	50	340	79	55
19173 14	221	74 50	251	76	19	281	77	35	311	78	52	341	79	58
192 73 15	222	74 53	252	76	22	282	177	42	312	78	54	342	80	(
193 73 .18	223	74 55	253	76	24	283	77	44	313	78	57	343	00	
194 73 22														
195 73 25														
19673 28	1		1	_		-			4					1,000
197 73 32														
198 73 35														
200 73 42	220	75 17	260	76	41	200	78	32	220	70	12	250	80	16
201/73-45														
202 73 49														
203 73 52														
204 73 55														
205 73 58	4				-	1						_	_	
		75 35			0	296	78	17	326	79	26	356	30	28
207 74 5		75 38			2	297	178	19	327	79	28	357	80	20
20974 8		75 41	268	77	15	298	78	21	328	79	30	358	80	32
209 74 12	239	75 44	269	77	8	299	78	24	329	79	32	359	80	34
21074 15	240	75 47	270	777	11	300	78	26	330	79	34	360	80	36

The first rumbe from the Equinodiall.

7	DE LEISENE UL A	E SCHOOL STATE AND DESCRIPTION	orth, East an orth, West and		
Lon Latin.	Lon. Latitu.	Lon Latur.	Lon. Latitu.	Lon. Latitu.	Len. Latita
		Deg De Mis.		Deg De.Mi.	
1 80 38		61 82 23			15184 29
	32 81 35	62 82 25	Andrew Co. Co.		152 84 26
3 80 42		63 32 26			15384 27
480 44		-	The second secon		15484 29
5 80 45		65 32 29	95 83 14		15584 30
7 80 49	The second second	66 82 31			156 84 31 157 84 32
780 49	The Contract of the Contract o	68 82 34			15784 32 15884 33
930 53		-			15984 34
1080 55	THE THEORY OF A	THE REAL PROPERTY AND ADDRESS OF THE PARTY AND			16084 35
11 80 37		The second second		13184 1	161 84 36
12 80 59		72 82 40	And the second s		162 84 38
13 31 1		73 82 41	103 83 25		163 84 39
1481 2			104 83 26	13484 5	16484 40
1581 4	45 81 57				165 84 41
1001 0	40 01 59		106 83 29		166 84 42
1781 8			107 83 30		167 84 43
1881 10	The second secon	Designation of the last of the			168 84 44
1981 12	4982 4		10983 33		7084 46
21 81 15	50 82 5				7184 47
2281 17	12 82 -8		112 83 37		72 84 49
23 81 19		COMPANY OF THE PERSON NAMED IN	11383 38		73 84 50
2481 21	5482 12	84 82 58	11483 39		74 84 51
25 81 22	55 82 13	85 82 59	115 83 41	145 84 18	75 84 52
25 81 24	56 82 15		11683 42	145 84 19 1	76 84 53
27 81 26	57 82 17	87 83 2	117 83 43	147 84 20 1	77 84 54
28 31 28	18 82 18		118 33 45	4884 22	78 84 55
2981 30	5982 20	8984 5	TABLE OF THE REAL PROPERTY.	14984 23	7984 56
3081 31	60 32 21	9083 6	120 83 47	G G	80 34 57

The first rumbe from the Equinocliatt.

en Latitu.	V.ou.	Latitus	Lon.	LA	tun.	Lon.	1	LARL	Lon.	Las	stw	Lon.	Las	its
Deg De.Mi.					Mi	Deg	Do.	Ms	Deg	De.	Ms.	Deg.	De	M
8184 58	211	X 28	241	185	44	271	86	19	301	86	41	131	87	
82 34 59	212	85 20	242	184	77	1272	36	20	302	86	41	332		
8385 0	212	84 20	243	185	36	273	86	-20	1303	86	42	333	87	
8485 1	214	85 31	211	85	57	274	20	21	304	30	43	534	10/	_
85 85 2	215	85 32	245	85	58	275	86	22	305	86	43	335	07	
8685 3		85 32				276	80	33	300	90	44	330	07	-
8785 4	217	85 33	247	86	5 60	277	86	34	307	00	4.5	757	27	
88 85 5		No. of Concession, Name of Street,	248	-		278								_
Committee of the second	215	85 35	249	186	2000	279	00	45	309	20	40	140	87	
	220	85 36	250	100	2							341		-
9185 8	221	35.37	251	00	10	282	9%	27	12	80	48	242	87	4
9285 9	222	35 38	224	100								343		
	223	35.39 85 40	254	25	5	284								
94 85 11					100	285								
96 85 13	1226	85 42	256	36	2 TO . E. C.	286								I
19785 14					-							347		1
19885 15	228	85 43	258	86	9							348		ľ
100/85 16	229	84 44	259	186	4	289	86	32	319	86	53	349	87	1
200 85 17	230	85 45	260	180	10	290	36	33	320	86	54	3.20	87	1
201185 18	221	84 46	251	186	H	291	86	34	321	86	54	351	87	1
202 85 19	232	35 47	262	86	17	292							87	I
202 85 20		85. 48	253	86	13	293	85	35	323	86	50	3 53	157	1
204 85 21	234	185 49	45.00	136	13	294	100	30	324	100	70	524	924	-
205 85 22	23	1 30 Mg t - 30 Mg - 3	269	1 1 30	14	295 196	00	36	325	92	2%	227	37	1
206 85 23	1230	85 50		36	1	KY.	195	10	17	104	20	750	187	Ì
10783 24	23	35 51	2.2. 6	86	1-60.3	198	26	30	379	86	30	336	87	T
208 85 25	1	285. 53	1	186	-	299	-	20	23	25	120	250	87	1
20985 20	240	385	State A.	100	13	41	100	18000	220	87	0,0	360	87	1

The first rumbe from the Equinodiall.

The		all and by Nor. Veft and by No			
Lon. Latin.	The second division in which the party of	Lon. Latin		The Salara and Comments and Com	Lon. Latin
Deg De Mi	Deg De Mi.	Deg De.ML	Deg De. Mi	Deg De.Mi	Deg. De. M
187 18	3187 34	62 87 49	122 38 13	183 88 34	273 88 5
2 87 19	32 87 35	64 87 50	124 88 14	186 88 34	276 88 5
3 87 19			126 38 15		27988 5
487 20			128 88 16		
587 21	A COLUMN TO SERVICE A SERVICE ASSESSMENT OF THE PARTY OF	7087 53	130 88 16		28588 59
687 21	A CONTRACTOR OF THE PARTY OF TH	72 87 53	132 88 17	19888 38	18889
787 32	A COLOR OF THE PARTY OF THE PAR	7487 54	134 88 18		29189
8 87 22	-		136 88 18		194 89 1
987 23	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		13888 19		297 89 1 300 89 2
1187 24			142 88 20	Contract of the second	303/89 3
	4287 40	THE RESIDENCE OF THE PARTY OF T	144 88 21	125 Chic 14 (125 St 2 2) 104 97 14	See a company of the second
13 87 25	BURGINGS WITH STREET	86 87 59	146 88 22		30989 4
1487 25	A STATE OF THE PARTY OF THE PAR	8888 0	148 88 23	222 88 44	312 89 4
1587 26	The second secon		15088 23		315 89 5
1687 26	Charles and the property of	AND THE RESIDENCE OF THE PARTY	152 88 24	THE CHARLES AND ADDRESS OF THE PARTY OF THE	the state of the s
1787 27	47 87 42	94 88 3	15488 25	131 88 47	32189 6
1887 28	48 87 42	96 88 3	156 88 25	234 88 47	324 89 7
1987 28	49 87 43		5888 26		
2087 29			6088 26		
2187 29		Committee of the commit	62 88 27 2	ACCOUNT FOR MALE TO THE PARTY OF THE PARTY O	Committee of the Commit
22 87 30			6488 282	-	
	53 87 45	PERSONAL PROPERTY AND ADDRESS OF THE PERSON	6688 28 3		
2487 31 2587 31			68 88 29 2		45 89 10
26 87 32	55 87 46	11288 10	7088 30 2	55 88 52 3	48 39 11
27 87 32	57 87 47	11483 10	7488 71	6188 54	51 89 11
887 33	5887 47			6488 55 3	54 89 12
2987 33	5987 48		78 88 32 2		57 89 12
1087 34	6087 48	12089 13 1	8088 33 2	7088 50 3	A SECTION AND ADDRESS OF THE PARTY OF THE PA

The first rumbe from the Equinoctial.

	of East and	by North	-East and	by South:	
The rumo	e of Real man	VOKOD, CO	A SALL	123000	way.
	Livelt and	aby North	, west an	ia by South.	

on	Latitu	Lon	Lation.	Lon.	Latitu.	Lon.	Latun.	Lon.	Latur.	Lon.	Laur
Der	De.Mi.	Deg	De.Mr.	Dee	De.Mi.	Deg	De.Mi.	Deg	De.Mi	Deg	De.M
3	39 13	94	39 26	215	39 37	6	89 46	190	89 52	105	89 5
6	89 14	98	89 26	220	80 37	12	39 40	200	89 52	210	39.5
9	39 14	102	39 27	225	89 38	18	89 47	210	89 53 89 53	225	39 5
12	39 15	100	89 27	230	89 38	24	39 47	220	89 53	240	89 5
15	39 15	I-IC	39 27	235	89-39	39	89 47	23G	89 53	2:55	39 5
18	39 10	114	39 28	240	89 39	30	09.47	240	89.53	270	89 5
21	89 16	118	89 28	245	89 39	42	89 48	250	89 53	285	89 5
24	189 10	122	89 29	250	189 40	48	89 48	260	89 54	300	89.5
27	89 17	120	89 29	255	89 40	54	39 48	270	89 54	315	89 5
30	100 10	130	109 30	200	109 40	00	09 40	200	89.54	330	09 5
35	180 18	134	80 30	270	30 41	72	109 40	290	89 54	345	09.5
20	180 10	T 42	80 31	370	180 41	1-12	29 49	300	89 54	300	09.)
42	80 10	146	80 21	280	185 42	8	80 40	310	139 54 189 55	30	99 5
T A	80 10	150	80 22	28	180 42	00	80 40	320	89 55	40	09
48	89 20	154	89 22	200	80 42	06	30 50	240	89 55	. 80	200
5	180 20	158	30 22	20	80 42	102	180 50	350	39-55	100	Quine
54	189 21	162	89 33	300	89 42	108	80 50	260	39 (55	130	80 5
57	89 21	166	89 33	304	39 42	114	80 50	Is	89 55	040	20 5
60	189 21	170	89 33	310	39 43	120	80 50	20	89 50	160	80 5
6	189 22	174	139 34	319	89 4	126	39.50	45	89 56	180	80 5
Ó	109 32	1/0	129 34	113.20	109 44	132	89 51	60	30 46	200	80 5
0	939 23	1182	189 34	1329	189 44	128	130 51	75	180 46	220	80 .
1	109 23	100	129 35	11334	129 44	144	189 5 L	90	89 56	240	89 5
	109 23	11190	109 25	112-2-4	130 45	I CC	NO CT	TOP	120 00	260	89 35
/	009 24	11 - 54	109 35	11240	130 45	1170	XO CI	Tac	20	280	89 5
0	1 59 24	1198	139. 26	244	180 45	161	180 =1	1120	100	-	89 5
0,	1109 44	11202	109 30	113.55	109 45	116	139 52	ISC	39 57	120	89 5
0	7 89 25 0 89 25	1200	199 30	1355	109 46	174	89 52	165	189 57	340	89 5
3	CO 25	1240	109 37	360	189 46	180	39 52	180	89 57		89 5

The fecond rumbe from the Equinoctiall.

T	he rumbe of	West Northwest	t, Bajt Sunt eft. West Som	thealt:	T.
Lon, Latite.	Lon. Laun.	Lon. Latin.	Lon. Latun	Lon. Laun.	Lon, Lunn
Deg. De.Ms.	Deg De Mi	Deg. De Mi.	Deg. De. Mi	Deg De Mi	Deg. De Mi
10 24			9133 14	12144143	151 52 53
20 49			The second secon	122 45 1	
314 14	1 2 2 2 2	63 25 14		123 43 18	the state of the s
41 39	3413 56			124 +5 36	Description of the last state
513 4	35 14 20			125 45 53	Section of the sectio
62 29				126 16 10	
7 2 53 8 3 18		6726 43		127 46 18	
	38 15 32			128 +6 45	The second of th
93 43	3915 56	The state of the s			159 54 50
1114 22	40 16 20		-	130 47 19	Residence of the Park Street, Square,
124 57	4110 44			13147 35	53 . IN C. A. P.
135 22	42 17 8	and the second second	The second secon	132 47 92	Committee of the Party of the P
145 47	43 17 31			133 48 9	
156 12	4417 55	The second name of the second		135 48 42	The second of th
166 36	-4618-42	26 30	10640 8	136 48 58	166 16 28
199	A700-6	27 30 21	107 10 27	137 49 F4	PATIENTES
187 26				138 49 30	The second secon
197 50	State, State Stateman, several state of	Total Control of the		139 19 47	
208 15				140 90 3	
218 39		8131 40			174 17 36
22 90 4				142 50 34	
23 9 29	53 21 26			143 90 50 1	-
24 90 53	5121 49		114 12 38		74 58 15
25 10 17	55 22 12	The second secon	ulis 12 56		75 58 28
26 19 42	56 22 35	86 33 31	1116 43 14	146 1 P 37	76 58 41
27 11	57 22 58	THE RESIDENCE OF THE PERSON NAMED IN	117 43 32	147 51 52 1	7758 54
28 11 31	58 23 20	88 34 12	118 43 50	148 12 2 7	78 0 7
2911 55	59 23 43	8934 33	11944. 8	149 52 23 1	79 19 20
30 12 19	60 34 6	90 34 53	120 44 26.	130 52 36 1	80/59 32
		L. C. L.	1	93	1

The second rumbe from the Equinottiall.

	n	معدام	ube of 3	Saft 2	Vorthe	aft, E	aft .	South	beef				}		1
	10	- Pan	5	Veft !	North	west,	West	Jose Latin	MIL.	Lon.	Lati	Les	Lon	La	ithe.
Lon.	Latun.	Lon	Latur. Do Mi.	LON	De		real	De A		Deel	De.	Mi	Deg	De .	Vie
	De.Mi	Deg	05 27	241	70		71	7	10	201	77	2	331	79	33
181	59 45	311	65 37	242	70	16 2	72	74	3	302	77	8	332	79	37
100	160 TO	212	65 A7	1243	170	24 2	731	74	10	303	11	13	333	79	42
184	60 22	214	55 57	244	170	32112	741	74_	1/	3	11	19	334	79	413
TO-1	60.00	210	156 9	124	170	41112	2751	74	231	300	16	24	335	100 to 10	50
186	60 46	216	66 17	140	470	49	2701	74	30	300	11	2	330	79	55
187	60 58	217	66 27	24	770	57	277	74	37	307	77	5)	33/	16	79
			66 37			2	170	4	43	308				80	- 8
189	61 22	21	66 47		77	21	179	74	56	310	77	51	340	80	12
190	101 34	1	167 6	1	171	20	281	75	2	311					
	61 58				2 7 I	37	282	75	9	312	78	1	342	80	20
	362 5	22	2 67 30	125	374	45	283	75	15	313	78	б	343	80	25
- 1 C T T T T T T	62 2	122	4 67 35	25	471	52	284	75	22	314	78	11	344	180	29
19	5 62 3	22	5 67 4	5 25	5 72	0	285	75	28	315	78	16	345	180	33
190	562 4	1 22	667 5	1 25	6,72	008	286	75	34	310	178	31		180	3/
SEC STATE OF	A BUTCHESON AND	5 22	768	3 25	772	15	287	75	40	3	70	26		180	1
110	863		868 1 968 2		074	35	280	72	10	210	178	26	21	180	45
19	053 2	3	068 3	1 20	072	38	290	75	39	320	78	41	2 50	80	13
Contract of the Contract of th	163 4	The state of	CONTRACTOR OF THE PERSON NAMED IN COLUMN 1	0 26	1 72	45	191	76	3	32	178	46	35	180	
20	263 4		268 4											181	1
20	364	2 3	3 58 5		53 73					32	3 78	56	35	3 81	10.8
20	464 1	-	1469	7 20	54 73	7	294	16	22	32	479	0	35	4 81	- 3
20	5 64 2	2 4 1 1 100	35 59 1		55 73							Control of the Control	110 67(2)	581	D
20	6 4 3		2669 2			20					5 79	A SHARESTON	1 4	5 8 I	20
			3769 3 3869	3 5	58 73	-24	20	876	4	132	7 79		13)	188	2
DESCRIPTION OF THE PERSON.	08/46 5				69 73	42	20	0 76	W.	22	9 79	ALC: UNKNOWN	124	981	1000
2	1065		4069		7073			0 76			079	28	36	081	U
	and introduce a literature		-		decoras	ler-y-ide		a think		1	N (8-15 -1525 1)	man and	11.		Line .

The second sumbe from the Equinostiall.

on. Laten.	Los. Laure	Long Lature	Lon. Latur.	Lon. LAISEN.	Lon Lasus
eg. De Mi.	Deg. De Mi	Deg. De Mi	Deg. De.Ms.	Deg De. Mi	Deg De.M
181.34	SAME AND ASSESSED TO THE PERSON NAMED IN	CONTRACTOR OF TAXABLE PARTY.	91 85 35	121 86 27	151 87
281 38		62 84 34		122 86 28	
3 81 42	33 83 18	63 84 36	93 85 39	123 86 30	153 87 1
431 45	3483 21		DESCRIPTION OF PERSONS ASSESSED.	124 86 31	1.5418Z 86
581.49		65 84 41		125 86 33	155 87 1
681 52	35 83 27	66 84 43	the time of the last of the la	126 86 34	
781 56	37 83 30	307 94 45	010-	12.7 86 36	
881 99	3883 42	68 84 48		129 86 37	
998 3	39 83 35	6984 5C	100 35 52	130 86 40	16087 1
1083 6	4C 83 38	7081 52	KOTIKE SA	131 80 42	16187 2
11 32 9	A-103 41	74 84 54	102 84 56	32 86 43	162 37 2
1282 13	THE RESERVE THE PERSON NAMED IN COLUMN TWO IS NOT THE OWNER.	92 84 50	103 85 57	122 86 44	163 883
1382 19 1480 19	4482 40	7484-1	1104 85 59	134 80 401	104 05 0
15 33 23	4582 52	7585 3	105 0001	135 36 47	165 87 2
1682 16	46 82 54	76 85 5	100 40 3	135 90 45	100 07 2
1783 29	47 83 59	7786 25	1107100 114	139 80 50	161 20 3.
1882 33		17886 6	110886 6	138 86 51	108 600
1983 30	10	79 85 13	109 86 8	13986 53	TO COM
20183 39			11086 6	140 86 55	MAN CONTRACTOR
21 82 42	CONTRACTOR AND ADMINISTRATION OF THE PARTY O	TALLO A OF	11186 11	141 86 56	172 8973
22 83 45	52 84 10	THE PERSON NAMED IN	112 86 12 113 86 14	STATE OF THE PROPERTY AND ADDRESS.	
2382 48	5384 12	8/20 22	114 85 16	144 87 0	174 8982
24 82 51	54 84 15	8434 24	11486 17	145 87 1	175 87 30
25 82 32	35 04 17	8685 26	11686 19	146 87 2	176 87 37
2782	30 94 40	8785 28	11786 21	14787 4	177 87838
288	5884 24	8835 3€	11886 22	14887 5	17887 35
2082	50 QA 97	8088 32	11986 34	THE REAL PROPERTY AND PARTY.	17987 40
20 82 TO	60 84 20	9085 43	12086 25	15087 7	18087 41

The second rumbe from the Equinoctiall.

			C	cale t	vorincaji	100	ACTUAL		อสู่สอเจาะ	-	
1211/1000	Maria and part	STREET, STREET,		Service Contract	Lathu.	Time Company	Berlin Barrier Garden	Section and	_	-	
Deg	De Mi	Deg	De Mi	Deg	De.Mi.	Deg	De.Mi		De.Ms,	Deg	De.M
1000000	ACCURAGE VALUE OF THE PARTY OF	Elizabeth Laboratory	88 31		100 40 2 10 10 10	3	89 22	The second second	89 44		89 5
		-	88 32			-		The second	89-45		89 9
			88 33						89 46		
			88 34	-					89 46		-
			88 36						89 47	All the Control of th	89 5
92	THE RESERVE AND ADDRESS OF THE PARTY OF THE	Development (III)	88 37	- Company	89 6	-			89 48		80 5
74	STORY BUILDING	1 100 million	88 38	TO ALCOHOLD	CONTROL OF THE REAL PROPERTY.	28	89 28	76	89 48	70	800
			88 39			32	09 29	104	89 49	80	89.5
			88 41			30	99 30	192	89 50	90	89 5
			88 43			140	09 31	140	89 50	100	89 5
			88 44			12	24 30	240	89 71 89 71	I FO COL GOOD	PRESENT TV
	88 4		THE PERSON NAMED IN	726		and a second		-	-	1210	-
Contract of the last of the la	DOMESTICAL STREET, ST.	CONTRACTOR CONTRACTOR	38 46				80 34		89 92		
			88 47			-	30 25		89 72		
	88 9			124-66	30 Y9	100 march 100 mg	Committee of the commit	T THE BOOK	89 52	10 D. C.	AMERICAN PURSUES
14	86 19	274	88 40	1					80 93		-
					89 14	72	80 37	364		170 180	COMPANY TO STATE OF
18	88 14	278	88 51	338	89 19	76		E C MARKS &	89 54	190	
20	88 16	280	88 52	340	89 16	86	89 38	280	89 54	200	89 5
23	88 17	282	88 53	342	89 16	To the second	89 36	288	39 54	2 80	80 5
24	28.18	-	88 54	14	89 17		89 39		89 45	220	
20	84.70	286	88 55	340	89 17		03-6 5	用水源	070160	-	
130	88621	288	88 56	348	89 18	1000	10 PM 12 PM		100 100 100	D. 2 - 3 - 1	The second second
											89 5
5	88 24		000 58	352	89 19	101	89 41	338	89 56	260	80
5.4	10000	M 744	100 5 81	250	IXO DOL	1102	Carlo Sal	1330	89 56	270	
28	88 28	208	80 0	350	89 20	113	89 42	344	89 56	280	80 3
40	88 29	300		750	89 21	116	89 43	352	89 50	290	80 5
		7,50	100 101	300	89 21	130	59 43	300	89 56	300	880

The third rumbe from the Equinoctiall.

The rumbe of	Northeast and	by eaft,	Southeast	and by east.	
The rumbe of	Northwest and	by west,	Southny	est and by w	cft.

Lon.	Latitu.	Lon.	Latitu.			Lon. L			Latun		
Deg	De.Ms	Deg	De:Mi.	Deg	De. Mi.	Deg D	e.Mi.	Deg	De. M	Deg	De.M
1	0 40	131	20 16	61	37 42	915	1 49	121	62 3	151	70 2
2	1 20	100	20 54	_	38 13	The second			62 5	The second second	
. 3			21 31		38 44	11			63 1		The state of the s
4	THE PERSON NAMED IN	34			39 16	1		1	63 29		
5	3 20		22 45		39 47				63 47	11	
Colored Ma	4 0	1270.0	23 22		10 17			I have been a second	64 22		
7		-0	23 59 24 35	-0	40 48 41 18				64 39		
9	5 20		25 12		4I 48			A STATE OF THE PARTY NAMED IN	64 50	of a lateral section	And the second
10	W 13 5 E		25 48			100 5		1.00			2
11		100 CH 100	26 24		_	1015		Sandy Service	-	4	Ministra, contracts
12		10000	27 0	72	43 17	102 51	5 . 8	[32	55 40	162	72 4
13	8 39	143	27 35			103 58					
14	0:		28 11			104 50					
15	9 58	45	28 46	75		105 57					
16	10 37	46	29 21	76	45 11	106 57	36	136	66 51	166	73 34
	19 17	. 01	29.56	37	45 49	10757	57	137	67 6	107	73 40
No. of Control	11 50		38 31			108/18					A
100	10 35	49	277			1095					The second
-	3 14	COMPANIES.	31 39	80		11059	-		THE RESERVE AND ADDRESS OF THE PERSON NAMED IN	ALC: UNKNOWN	ASSESSMENT OF THE PERSON.
	13 53	11	No.			11159				1. 4. 4. 1. 1	74 40
23	14 32 15 11	-				11360				THE RESERVE OF THE PARTY OF THE	deal or be designed.
-	15 49	53	33 54			114 50					1 1 2
	16 28		34 27	_		115/50		Marie Control			
36	COLUMN CONTRACTOR	56				11661			69 20		
27	7-45		35 33	87	50 -8	11761	19	147	59 34	177	75 31
28	8 22	58		88	50 34	11861	38	148	59 48	178	75 41
29	9 1	59	36 38			11961	57	149	70 2	179	
30	19 38	60	37 10	90	51 24	12062	16	150	10 15 H	180	0 1

The third rumbe from the Equinoctiall.

29	Latitu,	Lon	Latit		La	ti:n. i	Len.	La			La			Latit
Dec	De.Mi	Deg.	De.M	6. De	De.	Mi	Deg.	De.	Mi.	Deg	De.	Mi	Deg	DeM
	76 10													
	75 20													
	76 29													
	76 30													
	76 48													
	76 57													
-	77 6	-	_					-	-	-			-	-
	77 15													
-	77 24	11-		The second second			-	-			-		-	
190	77 32	220	31 1	2 25	083	47	180	35	37	3 10	86.	55	340	3704
191	177 41	221	81-1	8 25	183	51	281	35	40	\$F1	85	57	341	3715
192	77.49	222	81 - 2	4 25	284	56	282	83	43	312	35	53	342	87 5
193	77 18	223	3163	0 25	384	ಂ	183	83,	46	3 £3	87	T	343	37.5
194	178 6	224	81 3	6 25	484	4	284	85	49	3 P4	37	3	344	87 5
199	78 14	225	81 4	1 25	5 84	8	285	85	51	315	37	5	345	87 15
190	78 22	1226	81 4	7 25	6184	12:	2.86	35	54	216	87	17	346	3705
197	1/8 30	227	81	3 25	734	PO	287	85	57	3'37	37	170	347	87 3
100	378 38	238	813	18 32	8 84	20	288	36	07.	81.5	82	Ť	348	38q1
199	178 46	229	82	4 25	984	24	289	36	3	319	87	13	349	88
200	78 54	230	82	9 26	0154	28	290	36	6	320	87	75	390	2.88
20	19 2	231	82	15 36	1184	32	291	86	8	321	37	17	331	2188
20.	79 9	1232	82-1	10 20	2 84	2.5	292	36	PI	322	87	19	352	88.7
20	79 17	233	82 4	26 26	3 34	139	293	36	14	323	87	21	353	88
201	179 24	234	102	1 26	4101	43	294	86	16	324	87	22	354	88
	11/2 3	110	104	(01120	1174	4.71	705	WA	In	70 .	0			30 34
-	7 3	11-20	04	11120	0104	10.	200	156	71	1936	Q-	66	- C	ODGL
30	N79 40	235	182	5 T 26	20	54	297	30	24	327	87	28	357	88 1
20	980	773	182	56 26	004	27	298	36	26	228	87	29	338	88 1
-	080	- 55	104	1 27	905	1,	199	86	29	320	87	21	250	8851
-			103	-1-1	213	4	300	00.	31	330	87	22	250	881

The third rumbe from the Equinodiall.

Thomashea	- North	cast and	by calt	Sombeast	and by east:
The rumbe of	North	west and	by weft,	Southwell	t and by west.

Lon	Latitu.	Lon.	Latitu.	Lon	La	ticu.	Lon	L	atus.	Lon	L	asitu	. Los	ı. L	atita
Deg	De . Mi	Deg	De. Mo	Deg	De.	Mi.	Deg	De.	Mi	Deg	De	.Mi	De	gDe	M
	58 17		38 47		89								310		
	38 18				89					The second			320	-	
	88 20	33	38 49		39			41	25				330	189	57
	38 21		88 50	-	79		-	189					340		
	88 22		88 51		39	3000	IOC			179			350	130	57
	38 23		38 51		38	The second second		-		189	100	_		139	
	38 24		88 52 88 53		89	1			1 10 100	19				89	
_	88 25		10	-	189	_	108			19		_	11	89	
	88 26	40	98 54 88 54			13	110			200	1				58
-	88 28		88 55	-	-		112	_			_			189	
	38 29		88 56				114				7 1	50		89	
_	88 31	-	88 57		89							_	-	89	
	38 32	44	88 57		89	10. 10.00	118							89	
	38 33	45			89	_	120	_		225	139	_	-	189	
	88 34	46		76	89		122			230	89	52	100	89	59
	88 35		88 59		89	17	124	89	35				FIC	189	-59
10000	38 36	48	80 0	78	89	A to the same of the	126			340	89	52	120	89	59
19	88 37	49	39 1	79	89		128			245		70.00	130	89	59
20	88 37	50	89 2	80	89		130			250	189	53	140	89	59
2.1	08 38	51			89		132			255	-		150		
22	38 39	52	89 . 3	82	89	_	134	10.0		260	_	_	-	_	
- 2	88 40	53			89		136			265			170		-
	38 41	54			89		138	_		-	_		180	-	59
25	3 42		C C L L D C C C L D C		89	21	140	89	39	375					59
26				86	89	31	142	09	29	280	189	.55	200	09	39
27	88 44	57	89 6	87	89	22	144	89	40	285	89	35	210	69	59
	38 45	58		88	89	22	140	09	40	190	09	35	220	0)	39
	88 46	59		89	89	23	140	80	41	195	30	30	230	80	59
39	88 46	60	89 8	90	59	23	150	E	7	300	99	10	240	ass	27

The fourth rumbe from the Equinoctial.

		2 South	reaft, South	reft.	
Loa. Latitu	Lon. Latuu	Lon. Latte.	Lin. Latitu.	Lon. Latitu.	Lon, Latus
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16 15 47	46 11 43	76 50 16	106 12 7	13679 21	166 83 4
17 16 45			107 12 25		167 83 4
18 17 42		7851 14	108 72 43	138 79 42	16883 5
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20 19 36		80 62 11	11073 18	4089 3	170 34
21/20 32	11	81 52 39	11173 35	141 80 14	171 84 1
22 21 28		82 63 6	112 73 52	142 80 24	172 34 1
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The fourth rumbe from the Equinodiall.

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95 86 10	225 87 44 226 87 46	255 88 39	285 89 12	330 89 37	90 89 50
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The fifth rumbe from the Equinostialt.

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5 7 27	35 46 18	66 69 46	96 30 40	126 35 43	156 38 3
7 10 25	37 48 20	67/70:16	07/80 55	1127 35 50	157 88 - 6
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The first rumbe from the Aquinottiall.

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A most plain and sensible Demonstration of the agreement of this nautical Planisphare, with the Globe, and of the disagreement of the common sea Chart from them both in Chap, 42 120 210 210 210

peare howe greatly the common feath of the Chart (with paralell meridians and despects of latitude eueric where equall) well the Chart before described, agreeth with the same behold these three figures following, whereof the first is in all paynts answerable to a part of a spharicall superficies, contained betwixt two meandians, differing to longitude to degrees, and extended from the equinoctiall to the Pole. The second containeth to degrees in longitude, and 90; degrees from the equinoctiall in latitude, of the common sea Chart with equidistant meridians

Wardes the Pole, as before we have shewed.

Now all the other parts of the Globe of Charts are like voto these, therefore what agreement or disagreement is found in these parts must needes be also in their wholes. The first figure is a part of the

and degrees of latitude energe equals. The third containers to degrees in longitude, and 80 in latitude of the nautical! Planisphære, truely described with meridians in all places equidistant, and degrees of latitude increasing proportionably to-

A correction of Errors

the Globe, and therefore in al things frewerh the verie truch: therefore wee make it the rule to examine the rest by, for so farre foorth as they agree withit they are true, and as much as they differ from is, they are falle. Now therefore let ve bring then to the different a nongeninex or the

If there bee two places differing inlongitude and latitude to degrees (that which hath the grea. tendatiende being more to the efterards who fecond fignre as you fee maketh them liceach from other northeast and fouthwest, in what latitude forcier they be feiture, either nearen or further from the equinoctiallas in so and so jou in so and 70;or in 70 and 80 degrees of latitude. But in the first and third figure, thefe places faall beare almost northcast and southwest each from other, at the cournociallonely. And one place being fermate in so, and the other in 60 degrees of laritude, they fall. lie one from another northeast and by north, and almost halfe a poynt northerly. In 60 and 70 degrees of latitude they lie almost north northeast in 70 and 80 they beare each from other learee fo much as north and byeast. Therefore the common: lea Charr, in firewing howe one of those places. beareth from another, erredi in the fielt; one point of the compasse and almost an halfe in the second, two whole points almost, burin the third more: then there whole points. Neither is it possible to anoyde their lo groffe and palpable errors (if the rumbes be right lines, and the degrees of longitude and latitude eneric where equall) but wee must needes falkinen other errors as groffe as thefe, either.

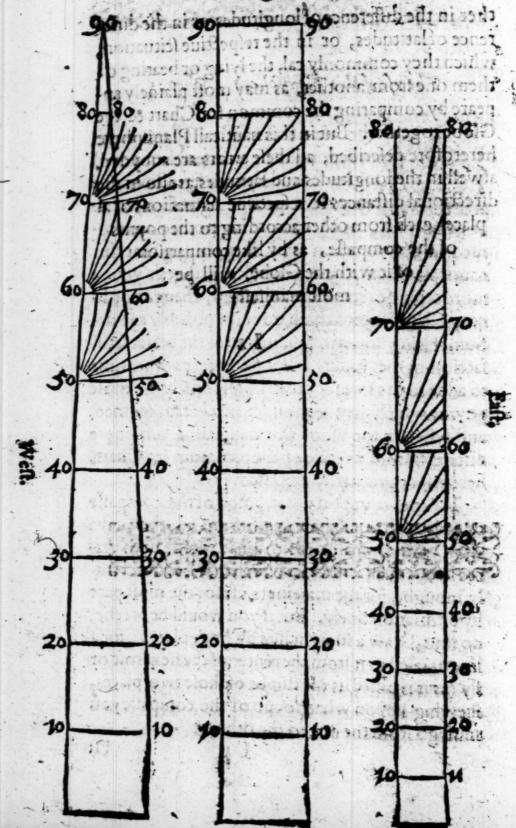
in the Sea Chart.

ther in the difference of longitudes, or in the difference of latitudes, or in the respective scituation, which they commonly cal, the lying or bearing of them one from another, as may most plainely appeare by comparing the common sear Chart & the Globe together. But in this nauticall Planisphere heretofore described, all these errors are avoyded, as well in the longitudes and latitudes, as also in the directional distances & respective scituations of all places, each from other according to the poynts of the compasse, as by like comparison of it with the Globe, will be most manifest.



10 to 10 -

in the Sea Cheffe.



and)to both places : take with vour off in The of this Planifphare. il Ghap . Sagnes e of theruler, then en illing and cary

F the vie of this Planisphere much more mought be written then now I have leyfure or cause to sette downe, a great parte bereof being in fuch fort to be performed, as hath beene heretofore accusto? med in the common fea Chart, faving that this nauticall Planisphære generally bringen you to more certaine trueth in conclusion, then the ordinary Chart hitherto hath done, or possibly can do. Something notwithlanding; for the better fariffaction of the reader) I thought meete at this time so adde to the former treatite colpecially in those poyme which may be most feruierable for sea men, and wherein the vie of this nauticall Planishere different from the vision the common les Charts heretotole ordinarily pradifed and suit obn

To knowe vppon what point of the compaffe one place in this Chart lyeth from another, trye wish your compasses from what rumbe both places have equall diftance, which may be found truly inough, for the marriners vie for the most part by estimation onely. But if you would be precise, do thur, Draw a traight line by both places, ofor a said line paralelles it from the center of the next role or the (asiasis called) is the rumber of those two places?
Answing appeals white poyone to the companie your
annul go from the one to the lather and week about

Shur mo

A torrection of Errors

Orthus, (if you like not draw any tracs upon your Chart) lay the edge of a long ruler (reaching ouerthwart the Chart) to both places : take with your compasses the distance of the center of the next flie from the edge of the ruler, then guiding and carying one toote along by the cage of the ruler, leade the other foote parellel-wife that is keeping it af. ways equally at that distance from the ruler) for so it heweth you how shole places lie one from another. be performed, as hash beene hererofore

To finde the diftaunce of places.

The distance of moo places (as the marribers commonly take it and measure it in their Chates, is the legment of part of the numbe intercepted betweeps them, which howemuch it is in the ordinary measure of leagues thall trucky be found out by this Planishare, chush I (released to no in a

If both places haue one latitude.

If both places have the fame latitude, take with your compalles the length of a degree of the meridian at that latitude (take halfe the degree aboue, and halfe beneath that latieude) for for oft as you thall finde that length becomene the two places, so many score loanes atechene betwite them Ifthe distance be great for the more expedition you may take fine times the length of that degree, and counting it for an hundreth leagues, proceedes y inough, the the marriages whether the meaning

If both places longitude.

If both places have not the fame latitude, the pi have the same quinoctiall also not comming between clien, subtract the lefter latitude out of the greater but if she squinoctialt condebrarian them; (bilde book late) under tegerber, forhane you shis difference of lasis. tude betweene both placesor one od morl on hum.

Now

winthe Sed Chart. No

Mone if both places have she fame longitude, for many degrees as there is in the difference of lati-

But if they differ also in longitude as well as in If both places latitude, looke howe many degrees the difference longitude and offstitude containsth, to many degrees of the e-latitude. quinostiall take with your compaties and leading one foots in the equinostiall, mount forwardes the other also parallel-wife, keeping abwaies that distance, till it crosse the rumbe of those two places in such forth that one soots besting in that cross sings be other earried about, may but onely couch the pour postiallo. Then bearing taken with your compasses, the segment or parte of that rumbe betweene that crossing and the equinostiall, for both segment in the equinostiall, for both segment in the equinostiall, for both segment in the equinostiall, and see howe transport are contained between these poursoned between these poursoned between these are contained between these two places.

Or if this legment of the layd number greater they well can bee taken with the compaties, take the length of five degrees of the administrally best two energial ferre of your Compaties, and looke how all you can finde that lengthen the fegment aforefaide of the numbers for its many hundreth leagues is the distance of those two places.

The demonstration bereof cabnot be obscure to him that well considered the granderical reason of the projection and malking withis nautical Planishere before fette domine in the second Chapter, from whence it followeth that bicante the spherical superficies (whereobthis Planishare is concained to be geometrically an ideal contended in self-

Again

cucric

A correction of Briors

onerie way equally, at edette poynt of latitude betwist the equinoctial and Pole sell a spoke and ioyne it telfe round about to the concautie of the circumferibed cylinder, therefore the fegments of the metidian, and of any other rumbe intercepted betwint any the same two parallels, must needs increase in one and the same proportion. In Boutur

And confequently, as often as the legeneet of a meridian between any two parallels, is contained in the legment of any rumbe intercepted, betwixt thesame parallels in the Globe, to offenis the like lagment of ameridian contained in the fegment of the fame rumbe intercepted betweenethe purplets correspondent in this Planisphere. Therfore (suppofing the faide legment of the meridian in this Planulphane to be divided into to many equall parts as it containeth degrees) it followeth that to often asone of these partes is contained in the tegment of the sumbe aforelaide in this Planisphere, so many feore leagues is the diffance of the two places fet at the endes of that fegment.

Now it is manifelt that by the fethree fegments, that is, the fegment of the rumbe between the two places, the fegment of the meridian betwixt one of the places, and the parallel of the other (that is, the difference of latitude) and the fogment of the parallel intercepted betwixt one of these places, and the meridian of the other, which is the difference of longitude. I fay it is manifest that by these three segments aright angled triangle is made, because the legments of the meridian and parallel (which are two fides of this Triangle, include a right angle.

Again

inthe fea Chart. 19

Againe it is plaine, that taking with your compasfes to many degrees of the equinodiallas are contained in the difference oflantible's their guiding one foote in the equinocally and carrying for wardes the other parallel-wife; till it crolle the rumbe of those two places, in such fort, that one foote of the compaffer being force in what evolving, the other mooned about, may but onely touch the equinoctiall and laftly drawing from that groffing a line perpendicular to the equinoctiall. It is plaine I fay, that by this perpendicular and the two fegments, one of the aquinothistis bequeene this perpendicular and the rumbe rebeculor of the rumbe, betweene the perpendicular and the quitnoctiall : by these segments I say and the saide perpendicular, there is comprehended anonker right angled Triangle which by the 14104 de ud L. 7 Ram. is the to the former right angled Triangle, because two angles of them both are equally that is, the right angles, and angles of the fame rumber for the last of these triangles, the fide perpendicular que the equinoctial, is proportionable to the difference of latitude, and the legiment of the rutibe between the ende of this perpendicular and the equinodis all, is proportionable to the fegment of the lame rumbe contained betwitt the two places of hereforeby the 2 p 6.00 17 p. 11 Each because the line perpendicular to the equinoctially contained to many equal degrees of the aquinodiall, as there are equal parts in the difference of latitude (that is) fo many as there are degrees in the difference of latitude : thefe equall parts also of the perpendicio-

A correction of Errors

lar and difference of latitude are proportionable. Whereofit followeth that for oft as one of thele equall parts of the difference of latitude is contained in the feament of the rumbe betwixt the two plaecs (which before wee flewed to bee fo oft as a degree of the meridian in the globe, is contained in the fegment of the rumb betwirt the fame places in the globe foots is one of the faid equal parts of the perpendicular aforefaide (that is a degree of the aquinoctiall) contained in the legment of the lame rumbe betweene the forelayde crossing or ende of the perpendiculary and the aguinoctiall. Thereforclooks how many degrees of the equipoctial there are found in the legment of the sumbe of the two places; fo many feere legues is the diffance of thole two places, which was so be demonstrated, Thus bene your way locallible to fird out the distance betweene any twoo places measured in their tumbes which because it is then onely their smedistance (that is the shortest space betwixt the wpon the esperficies of the terrestrial globely hen both places die north and fourh each from other, or cast and west having no latitude : whereas otherwife the legment of the tumbe betweene the two places is alwaies greater (yea fometimes greater by halfe and more vin places facre northwardes or fourbreades) then the smedifiance : I thought goodalla here the fette downe the way to finde out she true diffance of any swo places, wherein I have beene and yet am publikely charged with my promile and meane at this time to discharge my felfe thefe equall parts also of the perplosted The

vinube sea Chart.

The true distance betwixt twoo places is the arch of a great circle intercepted betwixt them, which is thus to be found out.

It both places have no latitude (as when they are both under the aquinoctiall) and one of them also no longitude, the longitude of the other being lesse, or not more then 180 degrees: the longitude is the distance.

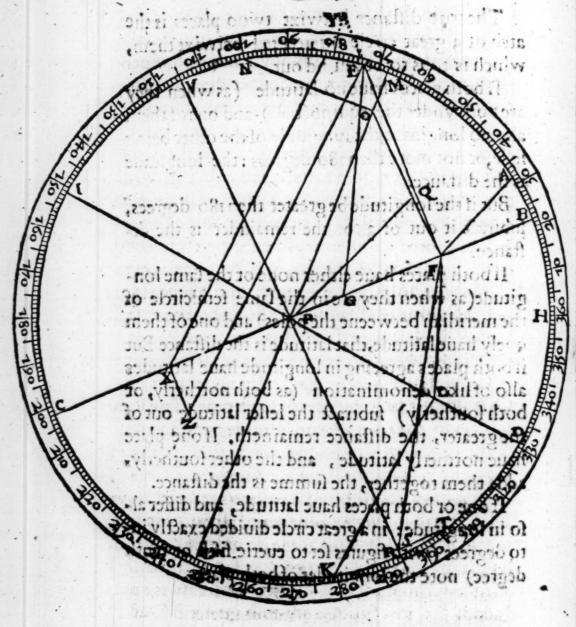
But if the longitude be greater then 180 degrees, subtract it out of 360. the remainder is the diffrance.

If both places have either none or the same longitude (as when they are in the same semicircle of
the meridian betweene the poles) and one of them
onely have latitude, that latitude is the distance. But
if both places agreeing in longitude have latitudes
also of like denomination (as both northerly, or
both southerly) subtract the seller latitude out of
the greater, the distance remaineth. If one place,
have northerly latitude, and the other southerly,
adde them together, the summe is the distance.

If one or both places have latitude, and differ also in longitude: in agreat circle divided exactly into degrees (with figures set to everie fifth or tenth
degree) note the longitudes of both places.

Plantifone place onely and latitude, district a sign of the confinence of the confinence of the companies and since the famine cited as the companies of the co

A correction of Ernors



Now if one place onely have latitude, drawe a diapeter from the long tude thereof, noted in the circle, and with your compasses take so many degrees and minutes in the same circle, as that latitude containeth: then setting one soote of the compasses.

win the featharts to

fes in the longitude of that place, with the other make a pricke in the circle, which may be called the poynt of latitude. From this poynt drawa line perpendicular, crossing the diameter drawne from the longitude of that place. Take with your coincle passes the distance of this crossing, from the poynt of the other places longitude, noted in the circle, and leaving one soote in the sayde crossing, with the other make a pricke, in the soresaid diameters take the distance of this pricke from the poynt of latitude noted in the circle. Then setting one soote of the compasses in that poynt of the circle where the degrees beginne to be numbred, the other foot extended that ways which the nubers proceed, shall sheweyou in the circle the distance of the places.

Take for example the cittie of London, and Saint Thomas Hand which lieth right under the zquinothind intenta degrees of longitude o The long gitude of Landon structo bezz degrees, abidins tude fa degrees 3 aminutes Marke the longitudes of Saint Thomas Handandot Lendon with A and B. From the long itude of Lendon (because wondon hach also deticute) the word diameter B C! Haumy taken with the compattes the latitude of Londonia the circle, second folder in B, and with the other sopke the prieke E in the citcle, and draw the perpendicular E Factor Ging the ediameter B.C. at F. Make The capelland Adventide is the diffine of Sains Themer Hand from the fine of Lundons 12situde, Then GE hall beesheline subcending the distance of those two places. Taking therefore the length of & Elwish the compaller, and fetting one foote 200

A correction of Errors

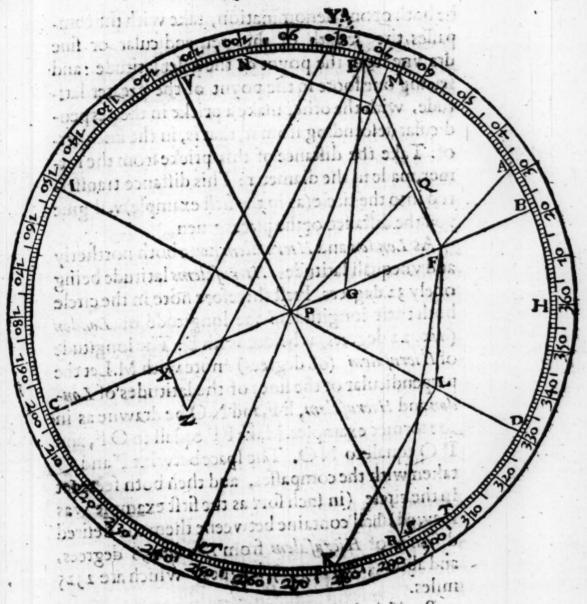
foote in H (where the degrees beginne) the other firetched forwardes in the circle, will poynte you out the distaunce of Saint Thomas Ilande and London, 52 degrees of a great circle, and about one halfe, that is, 1050 leagues, or 3150 english miles.

If both places have latitude, do the like for both places as before you did for the one place having latitude, till you have croffed both diameters with perpendiculars: then take with your compafies the distance of those crossings. Now if both their latitudes bee of one denomination (that is, both northerly or both southerly) and equall, sette one soote of the compasses where the degrees begin to be numbred in the circle, and the other soote extended therein, that way which the numbers succeede will show you the distance.

As for example, London and Cape Blanco (means the coast of new found land) have both northerly and almost equal latitude of 51 degrees, 32 minutes. Having therefore drawne as well the diameters B C and DL from B, determining the longitude of London (mic. 22 degrees) and from the poynt of the longitude of Cape Blanco (which admitte to be 33 a degrees, as also the perpendiculars or sines of both their latitudes, EF, and KL, (as before was shewed) crossing the diameters in F and L. The distance FL taken with the compasses, and translated into the circle (as the sommer example) will shew you the distance of cape Blanco from London, to becalmost 3 redegrees, of a great circle that it 620 leagues, or 1860 miles.

Ifthe latitudes be not both equally and also of

in the fea Chare.



one denomination, leaving one foote of the compasses in the crossing of the sine or perpendicular
discending from the poynt of the greater latitude,
with thother soot makes prick in the same diameter, wherein that crossing is. Then if the latitudes

A correction of Errors

passes the length of the perpendicular or sine drawne from the poyne of the lesser latitude: and setting one foote in the poynt of the greater latitude, with the other make a pricke in the perpendicular descending from it, that is, in the sine thereof: Take the distance of this pricke from the former, made in the diameter: This distance transferred into the circle (as in the first example) will give

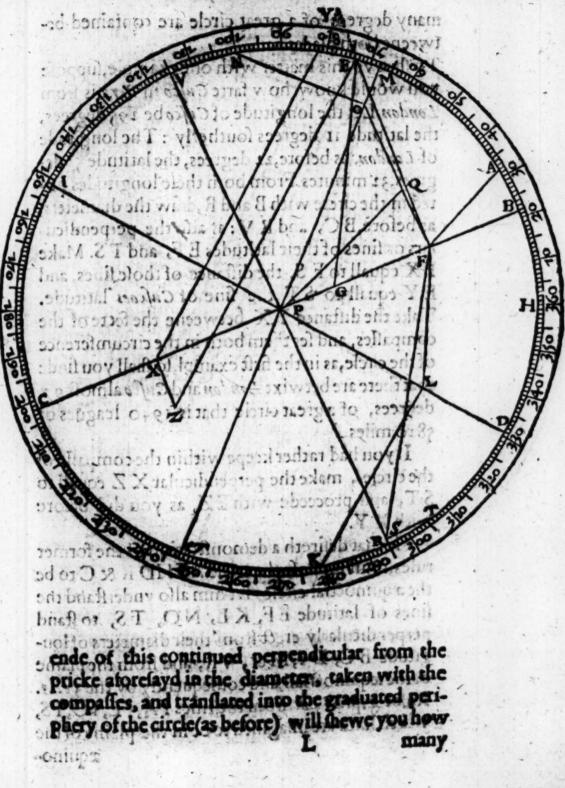
you the distance of the places given.

As London and Hiernfalem have both northerly and vnequall latitudes, Hierufalems latitude being onely 32 degrees. First therefore note in the circle both their longitudes : the longitude of London (vis. 22 degrees) as before with B: The longitude of Hiernfalem (68 degrees) note with M. Let the perpendicular or the fines of the latitudes of London and Hierufalem, E F, and N Q be drawne as in the former examples. Make FP equall to OF, and P Q equall to NO. The space betwixt P and Q. taken with the compasses, and then both secreset in the circle (in fach fort as the first example was thewed) thall containe betweene them the defired diffance of Hiernfalem from Danden; 38 degrees, and about 1 than is 774 leagues, which are 2325 miles.

But if the latitudes be of divers denominations, (that is, one northerly and the other foutherly) continue forth the perpendicular (that croffeth the diameter, wherin the forefayd prick was made) till it be equall to both perpendiculars, that is, to the fines of both latitudes. The diffance of the

end

in the fee Chare.



Acorrection of Errors

many degrees of a great circle are contained be-

To thus vp this matter with one example, suppose you would know how farre Culco in Pera is from London Let the longitude of Cafco be 295 degrees, the latitude it degrees foutherly : The longitude of Landon, as before, 22 degrees, the latitude sr degrees, 32 minutes From both these longitudes noted in the circle with B and R, draw the diameters, as before, BC, and R V: as also the perpendiculars or fines of their lawtudes E.F. and T.S. Make FX equal to F S, the distance of those fines, and EY equalito ST the fine of Cufcaes latitude. Take the distance YX betweene the feete of the compasses, and fer them both in the circumference of the eircle, as in the first exampl, to that you finde that there are betwixt London and Cufco almost 97 degrees, of a great circle that is 1940 leagues of 5820 miles.

Il you had rather keepe within the compasse of the circle, make the perpendicular X Z equal to ST, and proceede with EZ, as you did before with X Y.

He that desireth a demonstration of the former rules, multiuppose the circle AB HD R & C to be the equinoctial circle let him also understand the sines of latitude EF, KL, NO, TS, to stand perpendicularly erect from their diameters of longitude BC, D1, M&, VR, and from the plaine of the equinoctial, and consequently by the 3 2.21.

Ra, or 4. pr. 11 Esc. from the lines FA, FL, FO, FS, which lines are imagined to be in the plaine of the equino-

rowin the feathants to

the line fubres Vine the liftance of London and S. wing iqual to FS (the distance of icult to to line æquinoctiall; and are the distances of the sines of latitude. Therefore if EG be made aquall to FA (which is a line drawne in the plaine of the equinoctiall from Saint Thomas Hand to the fine of Londons latitude) E G must needes bee arquall to the CHO

A correction of Errors

the line subtending the distance of London and S. Thomas Hand by the are 7: Ra 4. 36 pr. I. Encl.

Alfo, because all the fines of latitude (beeing perpendicular so the same plaine of the equinoctiall) are parallels, by the s. e 21. Ram 6. pratt. Eucl. Therefore by the 11. cz. Ram, or 35 d.i. Euc. F.L. is the line subtending the distance of London and

Cape Blanco.

Againe, because FP wherero EF is perpendicularis made equal to FO, (the distance of the sines of London and Hierufalem, to which (diffance) EF is also perpendicular in the globe) and EQ also equal to NO: Therefore FO being the difference of the fines of Londons and Hierufalems latitudes: there must needs be the same distance betwist Pand Q that there is betweene the toppes of the fines of Hierusalems and Londons latitudes in the globe.

Laftly, FX being equal to FS (the distance of the fines of latitude of London and Cusco in Peru) 82 XZ perpendicular to FX, and aquall to ST she fine of Culcoes latitude: as EF is the fine of Londons latitude and perpendicular to the line line XF: EZ (to which XY is equal by the 6. C12. C5 Ram.33 pr. 1. Each. Y E being consil and parallel to XZ must needes be equal to a streight line extended within the globe betweene the points of latitude of Calco and London.

Now out of this demonstration it were an easie matter (if any fift take the paines to be lo curious) to find out the diffrance of any two places arithmetically by the doctine of triangles, having alwaits

CWO

in the fea Chart.

two fides gives which are the fines of the complements of the latitudes of the two places as OP. FP. LP, FP: RP, FP: AP, FP: together with the angle intercepted that is the difference of their longitudes: whereby FA: EQ: FL:FS the diftapces of the fines of laritude being found by the 3,3. 4.5. Copernic. de Triangulis planis, the lines nilo subtending the distances of the places may most eafily be tound by the 3. Copernic. de Triang. plan. For the fquares of the distance of the fines, and of the difference of the fines of their latitudes dif both be northerly or both foutherly) or of the fumme of the lines of their latitudes (if one be northerly another fourherly) are equall to the fquare of the line subtending the distance of the places 5. c. 18. Ram 47 pr. L. Encl.

With no leffe facilitie also by helpe of the former Tables, and the Canon of Triangles, any two places being given, there may arithmetically and most exactly be found out, first, by their longitudes and latitudes, the rumbe, and distance meafured in the rumbe : secondly, by their distance, and latitudes, the numbe and difference of longitude: thirdly, by their rumbe, and latitudes the diftance and difference of longitude: fourthly, by their longitudes, numbe, and one latitude, the other latitude and distance. fiftly by the rumbe distance and one latitude, the other latitude, and the difference of longitude; or any other nauticall or geographical probleme that by the Chart may mechanically be performed : and the whole Arre of Nauigariousrithmeticall (as some call it) may as easily be praA correction of Errors

Orifed . So as having onely the longitudes and latitudes of the places (by which , and to which you are to faile) fet downe in a Table, you may by arithmeticall calculation onely (if you lift take the paines) without any chart, mappe, of globe, thewe the source and distance from anie place to other; and for give most exact direction for the persourmaunte of an whole voyage to any knowne place assigned, how off focuer you have traversed or bin toffed this way and that way by reason of scant, violent, or contrary windes, or any other occasion.

But seeing the first groundes of this Art, that is, the observations of the latitudes; but especially of the courses at sea, cannot but be some from such exquisite trueth as is to be found in those arithmeticall operations: howe exact some you be in the rest of the meanes, you can look for no more truth in conclusion then such as is answerable to the first grounder and principles, out of which the conclusion is gathered. So as the Mariner shall not need to trouble himselfe any farther herewith, but only to cast up his accounts upon the chart early made (as before is showd) which of a other is most sit account of the chart early made (as before is showd) which of a other is most sit account of the chart early made (as before is showd) which of a other is most sit be before it may be sufficient, or ely to show the former Problemes may mechanically be performed open the nauticall planishment before described.

Pich By the longitudes and latitudes of both places graces whereaste and diffrance may thus be found drawer at alless by both latitudes take the diffrance brick of parallels according to which diffrance drawer parallel to the aquinoctials. Then

from

inthe Sea Chart.

from the end of the difference of longitude reckoned from the concurse of the rumbes in the æquinoctial erect a perpendicular crossing the saide parallel: A line drawn by this crossing from the concurse of the rumbes is the rumbe of the two places. Now to finde out the distance stake so manie degrees of the æquinoctials as the the difference of latitude containeth: and guiding one toote of the compasses in the equinoctials, with the other soot carried parallels wise at equal distance from the æquinoctials, crosses the rumbe newely sound out: take the distance of this crossing from the concurse of the rumbes, and set both seete of the Compasses in the equinoctials for the degrees intercepted shew you the distance desired.

Secondly, By the distance & latitudes (knowing which place is more eastwarder, or westwardes) the rumb & difference of longitude is thus found: Take with the compasses so many degrees and minutes of the æquinoctiall, as the difference of latitude containerh : According to that diffance draw. a parallel to the aquinoftiall, take fo many degrees. of the aguinodiall with your Compatts as the differen ginen commeth to then one foute being les in the concurle of the rumbes in the equinociall, with the other croffe the parallel aforefaide: A line drawne by that crossing from the concurse of the rumbes in the aguinochall, giveth you she tumbe defired . Then both latitudes being noted in the graduated meridian, therein take their diffetence with the compasses, and guiding one foote in the equinoctiall, with the other parried at that di-

distance

A correction of Errors

distance parallel-wife from the aquinoctiall, crosse the rumbe of the places : the diffance of that croffing from the meridian (that commeth from the common meeting of the rumbes in the equinoctiall) taken with the compasses, and brought to the equinoctiall, that thew you the difference of longitude. Or a perpendicular to the equinoctiall from that crossing shal poynt you out therein, the diffe-

rence of longuade.

Thirdly, By the rumb and laritudes (being both northerly or both footherly) the diffance and difference of longitude is thus found : Take the difference of latitudes in the aquinoctiall: according to that distance draw a parallel to the aquinoctiall (as before) crossing the rumb of the two places given: take the distance of this crossing from the concurse of the rumbes: Then both feete of the compasses fer in the aguinoctiall wil thew the distance of the places. The difference of longitude is found as be-

Fourthly, By the longitudes rumbe and one latitude (knowing whether it bee the leffer or greater) to finde the other latitude, and the distance, do thus ? From the concurle of the rumbes in the gquinoctall count the difference of longitude from hence erect a perpendicular crossing the rumbe: the distance of this crossing from the equinoctiall translated into the graduated metidian (letting one toote in the knownelatitude, and extending the other northwardes or fourthwardes according as the voknowne latitude is greater or leffer) hall thew you the latitude defired. Now to finde the diffance

of the Compasse.

diftance workers before in the first Probleme.

Fiftly, by the rumbe, distance, and one latitude, you may find the other latitude and the dissernce of longitude after this mainter: Take the dissance given with the Compasses in the aquinoctials: set one foote in the concurse of the rumbes, and with the other crosse the rumbe given: from this crossing drawe a perpendicular to the equinoctials the length of that perpendicular taken with the Compasses and brought into the equinoctials shall shall

Nowe in every one of these problems there may be some particular cases whereit some diversitie of working may tollow; yet such as can breed but small trouble to him that well shall conceive the prasto of that is already set down in these site for above the prasto of that is already set down in these site some plied to such places as are both on the same side of the arquinostially and differ also both in longitude ed latitude of which sort is the greatest number, and in which the greatest view and most difficultie of which the teaton of these mathematical practifes in a view the deficious would be now for mee

too long and redibust for lone rafter therefore to all white worthis amittall planishers, "I

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The true Meridian is an azimuth pasting by

Mow of the woll.

Of the Variation

Error in the Compasse, by the variation neglected, and how to of serve and anoyde the same. Chap. 6

NExt the fea Chart there is not any instrument of Nauigation whereby greater error may enfue then by the Compalle, if the variation beneglected. By which neglect alone v. c may ofte times millean whole poynt and more, in directing the courte from place to place. Notwithstanding, M. Peter of Medina laboureth greatly to prooue that there is no variation of the Compalle, and that many inconveniences and abhirdities must needs follow out of that opinion, as hee eftermeth it, thinking it to have no better grounde then the groffe and erronious observations of viskilfull Mariners, as by the third Chapter of his fixt booke of the art of Nauigation may appeare more at large. But daily experience (by many and diligent observations, with exact influments, beedfully yfed by skilfull observers, not onely at seas the vnconstancie whereof (which causeth the shippe to be alwaies volteadie) might give some colour to MaReters conscit of no variation: but also on firme land, where most steady and certaine observation my cafily be made:) I fay daily experience hath fo often, lo constantly, so manifestly proued this varying propertie to be in the Compaffe, that it can bely no meanes with reason denied in anol our

The variation of the Compasse is the arke of the horizon contained between the true meridi-

an and the magnetical meridian.

The true Meridian is an azimuth passing by she poles of the world.

of the Compasse.

The magnetical meridian is an azimuth that passeth by the poynts of the wires in the Compasses of the needle touched with the loadstone.

An azimuch is a great circle paising by the zenith, and confequently making right angles with the horizon.

A great circle is a circle dividing the world into

The zenith is a poynt in the heavens hanging right over our heades.

Theazimuth of the funne is an azimuth passing by the center of the lunne.

The azimuth is faid to be given, when the arch of the horizon betwint it & the meridian is knowne.

There are two azimuths of the funne, the true azimuth and the magneticall azimuth.

The true azimuth of the sunne is shewed by the arch of the horizon contained between the azimuth of the sunne, and the true meridian.

The magnetical azimuth of the sun is shewed by the arch of the horizon contained betweene the magnetical meridian 86 the azimuth of the sunne. The difference of these two arks of the horizon is

alwaies equall to the variation of the Compasse.

To find out the magnetical azimuth of the sun, we must first know upon what point of the Compasse the sun is: which although it may be done by aime very nearethe truth by him that is experieded, especially when the sun is low, or at the horizon rising or setting: yet it may better bee done with helpe of such a ruler and sights, as land measurers vie with their plaine tables, wherewith you may thus finde upon what point of the Compasse the sunne is.

M 2 Lay

Of the Kasiation

Lay the edge of the ruler right over the center of the Compasse; then holding the ruler so fixed, and the compasse level so nearest pour canadime of the compasse level so nearest pour canadime of the compasse passing through one of the sights, fal alongst upon the edge of the ruler, or midst of the opposite sight. The holding your eie in such fort over the Compasse, that the rulers edge may ly right upon the compasse, that the rulers edge may ly right upon the compasse the sight, look also upon what point of the compasse the edge of the ruler lieth to the sun-wards, for that is the point wherupon the sun is at that time; which for breuities sake may be called the sunnes point;

This point you shal looke in the instrument following, & it shal show you amongst the degrees the magnetical azimuth of the Sun. As for example, when the Sunne is due East by the Compasse, I would know in what magnetical azimuth hee is: Therefore I looke the east point in this Instrument, which directeth me to 84, degr. a which is the magnetical azimuth desired. And the difference betwixt this & the true azimuth of the Sun is the variation of the compasse which we look for. This difference, therefore shall thus be found out.

At the lame time when you observe the Sunness poynt, let the height of the Sunne hee also observed used. It is best to take both these, observations when the Sun is nearest the east on west as impulsion then the height of the Sunne altereth quickesty therefore at that time the true azimuth of the Sun shall best be knowne thus: First finds out the declination of the Sunne, temembring alwayes to glue allowaunce, ontake away (according as the gettination increaseth or decreaseth) for the place

and

monther Compasse.

Goldberg the lateriale of the place where your AGoldberg the lateriale of the place where you chferthe and followe the parall for the Sunner delipation, would you edine to the affairealth of the sunner that paffeth by their mutual interfection, is the true azimuth of the Sunne that was
lought for which if you follow downers the horizon, you half have that azimuth given. Now of
these two given azimuths (that is the true and
magneticall azimuth of the Sunne) subtract the
lesser from the greater, for the difference remaining is the variation of the Compasse: the denomination whereof (that is whether it be easterly or
westers) shall easily be discerned thus:

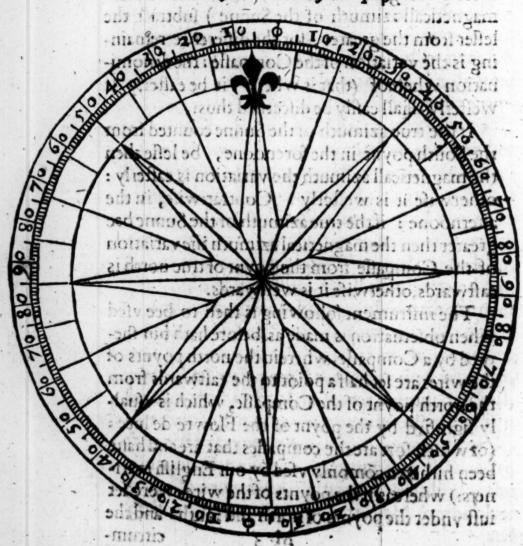
Af the true azimuth of the Sunne counted from the South poynt in the forendone, be lesse then the magneticall azimuth the/variation is easterly: the magnetical azimuth of the Sunne bee greater then the magnetical azimuth of the Sunne bee greater then the magnetical azimuth she variation of the Compasse from the poynt of true north is castivards, otherwise it is well wards.

The instrument following is then to bee ysed when observation is made as before hath bin she wed by a Compasse, wherein the north poynts of the wires are so balf a point to the rastwards from the north poynt of the Compasse, which is wouldly signified by the poynt of the Flowre de luce a (of which for are the compasses that are and have been higher compasses that are and have been higher compasses of the wires were set instruments;) whereas if the poynts of the wires were set instruments; whereas if the poynts of the wires were set instruments.

Of the Vortation

droumference of the Compalie divided into degrees both caltwards and well-wards beginning at the north and louth points, and ording with ap. at call se well-wounight at the first have the magneticall azimuth of the Supple by observation, and so there should be no neede of this instrument.

thon, is the mue asimum of the Sunnethat was telefor to sunnethat was telefor to sunnethat of the horizon, sunuas the following plants of the horizon sunuas alla que of the true and true



of Table page of the Property of the Property of

In the Table following you have the former rules exemplified, out of such observations as I tooke both at sea and land in the right honourable the Earle of Cumberlands voyage persourmed in the years 189, the particulars whereof most worthy to be remembred and commended to posteritie, I have historically discounsed and adjoyned to this Treatise, as whereby the Reader mought the better be satisfied in knowing more specially the places mentioned in this Table: wherein the letters N, W, S, E, b, in the first and second columnes signific North, West, South, East, by. The fractions in the second columne are parters of the poynt annexed. In the columne intituled, The time of observation, the letters A N, and B N, signific, after noone, and before noone.

and by amuner unt . robole tems. הנוחופונו עום שלבל נונים נחלמה 16. or A Lagues from I erear a Le 0 From S. Mares W 17 5 6 leap. 0 From S. Maries W by S & leave S 12 10 W 0 67 2 -323 From S. Maries louch & bearing 0-From Saint Martes 16 leagues EFEE 0 V W by W wether's 20 Some & George S & by 8: 2 leag. 0 78 From he east part of S. Wiebarts H SIKES U 0 19 VE by Walout 15 or 20 leag ELEVE OF 0 From the rocke IP about 53 leag. SEbyS 20 836:3 50 65

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A Table of able wations of

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and Saint Michaels.	WIN		igh		177
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These observations made in the	West, Sour	1120	3511	24	40
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William Borowes instrument of	A 279115 01				
variation (published in his booke	In auctor h				
of the variation of the compasse)		30	41	57	15
and by a quadrant, whose semi- diameter was almost two cubits.		46	13	17	53
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		40	42	32	45
or A leagues from Tercara S E	ESEAE	0	0	75	50
From S. Maries W by S 6 leag.	WSW	13	0	61	150
From S. Maries W by S 6 leagues	W by Sis	0	0	67	25
From S. Maries South 5, leagues	ESE'S	0	0	69	30
From Saint Maries 16 leagues N W by W northerly.	ESE 18	0	0	75	50
	ESE.	2	30	73	7:
From S. Georges S & by & 3 leag.	ESE & E	0	0	75	50
From the east part of S. Michaels NE by Nabout 15 or 20 leag		0	0	59	0
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news 60 reay.	SEbySis	26		37	30
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chodiaria Vada De Compasse.

Notwithstanding their bemuch difference betwine force pratice variations falen a the fame place with the ame infruments, yet we wied with what diligence we could fuch in truments as then we had prepared for that purpole which I speake, that others that hall go boin hereatter to observe the variation (at lea especially) may be the more ecknord circumsped to foresee and prouentail causes of er-ror herein. Exact true mamongst the enconstant waves of the sea is not to bee looked for, though eastward good inftrament ber neuer to well applyed. Yet with heedfall diligence we may conse to neare the trueth as the nature of the lea, out light and infirmthents will laffer vs. Neither f there be dilagree-DENE BO ment betweet objectiations are they all by & by to be rejected but as when many arrows are thouar a marke, and the marke afterwards taken way hee calman. may bee shought to weeke according to reason, who to find out the place who e the matter frood, thall feeke our the mandinglace arrong thall the arrowes: lo amongst many different rose stations, the middle most is tikest to come nearly chid south.

Causes of erior berein, tome pannot be aubycled, Barrat Jam at the white discille of the sup the map offection of calinard Jenie scih fine fishe weike Pelpective totec of the needle of wines, be they actiet to wel touched. Others may be elchewed, as that there be no from neare the Compatie in time of observation, that the wires becook kept too long vintouched from the stone, that inch instrumers be view for observation as need least working afterwards for finding out the variation , wherein the infituments betecaffront · cefivard 03 12 4N 44 30 2011 46 15 6 53

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tofort published for this pubpole, are failed; being fuch as force for observation onely or land tasal to requiring many workings after wards, wofin for Marines a before she maker canceone to iffue whereinbredstmany darking diel eloPetror with our goeist dil Genmeul washtherefore polo poled bute to have adjoymed the making and vielots cortains in throme ne (ho bich misy doe which be called the Marinemaningalesterby the variation of the comq patie and dire col she daying pre fede by given pocogie then wielall ordiferal tiphethe facture of the place bridg knowine), southbat wintertally throughout theworld bothan femund land Asalto the variation od beingig wealle slockeight of the pole and tioure of the day may reselvely be know he without those inshapenichosi, lavinerevent murche Vettefenis inframent, Chaperpaired of the afth Natigalie on and deschied Common by inhursel hasom fifthere de acinalistide substance bentandence in contraction of the beight of the fame, whichigas I halve oreladitle tivall an ignimuy thereby be more exactly perfect med, then land beene historie by flaffe ring, pring strolabe commonly vsed. But Fam at this time intorced to differre it.

In the meane time for them that want the Globe and Astrolabe before mentioned, I thought good toset downe a way whereby (the declination and heigth of the sun being given, togither with the latitude of the place) the sunnes true azimuth may be founde with ruler and compasses onely, after this manner: Drawe the circle ABCDEFGH, representing the Meridian, by the center heereof N 2 draw

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draine the his moter of the hocizon A Fiftion A the end of this diameter, seckon the electricion of the equinoculli A Coltom will coce draws line by the center, which may be called the diameter at the aquinodialbCH From C the end of this diameter count the declination of the lume D, thereby draw a parallel to the diameter of the equino (tial, which may bee called the dismeter of alse Sunnes. parallel DG. dishewife from the diameter of the hoginon author the height of the loo ABlanown by observation, and thereby also draw Bis a parallel so she dismetter of the horizon, which may bee called the dismeter of the funnes alonica dish. From I, the interfection of thele two parallels, drawe Iv Ky a line perpendicular to the diameter of the ho rizon. The ferring one foose of the Compalles in L the midf of B.E. the diameter of the funnes almicante card frenching out the other fortiero B the model this distriction from thence strave there with abroads B K sill you come to the fixed perpendiculous. This architefolund into degrees thall med, then lannul and to durant samual med bem frolabe commonly vied. But Jamar this time inreed to differte it.

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ues : which (abers Bedout of MOL, (the fine of election of the fine) there shall for since LO. whereby the first of the Triangle LIO, having on tright are gle at that deconfequently ILKs the ingle befored, are given.

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A First the Weitt and Compally the croffe Staffe may with good exfort acceptings in the staffe where the configuration is consisted; then may other influences of a may not a may not compared, and that there is surrall waie: First in upper ling the raralax consecution of the eye:

Secondly a not confidence the height of the eye action of water: I hard an not regarding the

For the first they count the height of the suns and startes and the country the startes and the country of the startes and startes and the startes and the

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uen: which subtracted out of MOL. (the sine of the sunner height) there shall remaine LO. wherby LI. in the Triangle LIO, having one right angle at L. and consequently ILK. the angle desired, are given.

they may be anoyded. Chap 7

A Fter the Chart and Compasse, the crosse Staffe may with good reason succeede, as in the view whereof more error is committed, then in any other instrument of Nanigarion, the two former excepted, and that three severall waies: First in neglecting the paralax of eccentricitie of the eye: Secondly in not considering the height of the eye about the water: Thirdly an not regarding the

paralax of the funne.

4

For the first, they count the height of the sunne and starres in such sort as if the center of the eye, or vertex of the visual cone in vsing the staffe, were even with the end therof applied to the eie. Therforehow much the center of the sight is distant fro the ende of the Staffe, so much are they deceived. But howe much the eccentricitie or paralax of the eye is, it may be knowne after this manner: Make two transversaries, the one twise so long as the other. The long est of these two six soll, as she sure they end of the index, the other of their money or downey placed at the ende of the index (in such sortes you will be placed which you observe your eye placed at the ende of the index (in such sortes) you will be placed which you observe your may

of the Compaffe.

may see both ends of both transuersaries lie euen togither. For then looke how much the segment of the index betwixt the two transuersaries exceedeth the segment from the shorter transuersarie vnto the eie, so much is the paralax or eccentricitie of your sight: that is the center of your sight, or the poynt within your eye, wherein the visuall beames concurre, is so much distance from the end of the index.

As for example, in this figure let the transuersarie HEI placed at E. the end of the index be double to the transuersarie FDG. which is placed in
such fort upon the index, that the visual lines (A
FH, AGI) of the eieplaced at the end of the index,
do passe straight on by Ft and GI, the ends of the
transuersaries. For in this figure A, is the center of
the sight or eye, wherein the usual lines (AFH,
AGI) do concurre B, represente the ende of the
index, placed at the corner of the eye, and then AB,
is the eccentricitie: C, signifieth the ende of the
index sette against the bone underneath the eie,
for observing of distances, and then AC, is the
eccentricitie, which is thus demonstrated.

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As HE is to FD, sis EDA to DA, 13. eq. Ra. But HE is double to FD by supposition: therefore EDA is double to DA, and DA the halfe of EDA.

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may fee both ends of both translueriaries lie enemy of the index, between the index, between the index resolutions of the index of the same income of your field that is the content of your field; that is the content of your field; that is the content of your field; that is the content of the your field in the your field of the index of the i

As for extende, in it figure ber de transfuerfa-DG. wilds to be end of the adex bedou rie HEI placellat E. th ble to the tra fluerfarie fucir for vpous he iade FH.AGDolibe do pulle firmighton by I fand firthe entry of the trauloerlaries, For men figureA. is the center of the fight of tye, whereat the valuall lines (AFI), AGI, do concurre the redestern the sude of the rof fe eye, and then All. index, placed at the torn is the eccentricitie : C. gamera the ende of the and x feete against the work ynderneath the eie, for observing of diskings, and then A C. is the eccentricities, which is they demonstrated;

As

As HE is to FD, so is EDA to DA, 13.e 5.Ra. But HE is double to FD by supposition: therefore EDA is double to DA, and DA the halfe of EDA, equall

Enot in vingehe graffa Staffe.

aqual to the other hald: DE Therefore hove much BD or CD is horter then DE, to much is the paralax or eccentricitie of the eie, and to much muft the transpersary be remooned forwards (from the place where he was let methorishe of your obless nation) towardes the tarre end of the index after you have obterned any heigh or diffance of the funne of flattes, that for you may have the true height bediftance defired Orelle you may have a plate of braffe to actificially fined close within, by the fide of the fquare hole in the transactiarie, through which the index is to be pur, that you may flip it forwardes or backwards like the court of a boxe, and fo let the foresedge therebilo much before the transuerfarie, as the eccentricitie of your eye commeth to (having first surned the flatte and streight side of the transpersarie from you ward, and pared the ends thereof, in fuch forether the vi fuall beames may touch the extreames of that fide) that of the edge of the plate may at the first showe voon the index the true heigth or distance of the funne or starres observed without any further correction. Otherwife if this paralax of the light bee neglected, there may be et sor of an whole degree and more lomerimes in observing with those smallerosse staucs which have beene commonlie mesache lecond column viedo

Secondly they increase the former error by not regarding the height of the eye about the water. Which althought be not to great a fault as the other, yet it may decouse them by increasing the former drady fine or first with utes or motern a talk.

Errorin whogship Cropse Staffe.

hip. For the higher the type is about the trater, the greaten is the angle intercepted betwixt the two visual dines, whereof one toucheth the conuex fuperficies of the fear the other paffeth on to the fun and the new esthe eye is the leffer is the forefayd angle hand then pnely it heweth the srucaltitude, when the tenter of the dight is in she fame line of level with the superseies of she water. But if she eye be higher then the waset, that angle is greater shen the true eltitude, and therefore subtraction must bee made accordingly, that you may have the true altitude. For this purpose I have made The beight Administro this cable here adjoyned, of the cie a- bee subtracbone the ma-sed. the wie whereof is this: when you observe the Minutes. heigth of the funne or Foote. Starres as fea wish athor croffe faffe, you shall also find but how many foot high your eye is about the water with a plumbline of otherwiles feeke shat height of the eye in she first columns of this Table : and in the fame 70 line in the fecond column funcialled dinmer selbed 90'

fubtracted) you had find what number of minutes are to be subtracted from the apparent height of the summer startes about the superficies of the sea subsequently with the staffer hanyou may have the appendiculations of the season such that the season with the staffer hanyou may have the appendiculations.

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Error in whing the Groffe Stuffe.

parent heigth about the horizon, I olumn till 10 1

The third error hath place in taking the heigh of the funne or moone with the staffe, ring, quadrant, or Astrolabe, or any other instrument, whether by fea or land : but in taking the heigth of the fixed frarres, this error is not to be regarded, being altogither infentible, by reason of their exceeding great distance from the earth, which is so much, that in comparison thereof the semidiameter of the whole earth liath not any sensible proportion, and therfore the fixed states cannot have any senfible paralax. But the funne by reason of his leffer distance from the earth, hath a sensible paralax un fo much that in taking his heigth, wee may for this cause onely bee deceived sometimes neare three minutes, by counting it lefte then it is indeede, and that especially in winter time, when the lunne draweth neare the horizon : which althought be no great error, yet te is not alrogither to be neglected in the rules and groundes of Art, which fo much as is possible ought to be without in the lecond columne I find the paralax admistis

bis thereto to bes minage. (ce which added to a c

degr. 2. tam. 42. fec.

He symto forme do also adioine the fourth cause of also cours by r aion of refraction of the becames of the apreciation of the apreciation with for aught 1 can finde by observation with large rastruments is little to bee regarded in anic meridian alutude of the Sunne heere at London:

But in the shares I have many times sound it to be some

Errorin ving the Crosse Staffe.

For this cause I have ad-	of the funne.		puralax e sunne.
ing of the luns paralax:	Degr.	Mi	Sec.
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tuled the height of the	10710	2	55
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cond columns, you hall	39	2	34
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funce, which alwaits is	Ructhe	Pare	16
to bee added to the appa-	45	1	10-
rent heigh, that fo you	30		34
may have the true heigth	1.172005	HIXO 2	18700
of the funne about the	100 65 .20	mic	25
horison. As for example,	70	H	is here f
admit I finde the appa-	75	0	46
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to be andegrees, therfore	THE PERSON NAMED IN COLUMN TWO IS NOT THE OWNER. THE	100 010 01	115
Lifecko shasi miyabetdini			1 200

in the second columne I find the paralax apswerable thereto to be 2. min. 42. sec. which added to 25 degr. make the true height of the Sunne to be 25.

degr.z.min.42.fec.

Hereunto some do also adioine the sourth cause of errour by reason of refraction of the beames of the sunne or starres through thicknes of the ayre: which for aught I can finde by observation with large instruments is little to bee regarded in anie meridian altitude of the Sunne heere at London: But in the statres I have many times sound it to be

lome

Error in ving the Crosse Staffe.

fome thing, especially when they come neere the horizon, and sometimes scarce any thing being but a sew degrees about the horizon. So as I think it not greatly needefull at this time to trouble the mariners conceipt herewith any more, for whose sake especially this labour was undertaken. As also I would not wish the to be greatly scrupulous for the former error rising by reason of the sunness paralax neglected: being such as at sea can either not at al, or at least very hardly be observed by any instrument. But our land where we may have steady standing to make exact observation, it would not altogether be neglected.

Error in ving the Crose Staffe.

Some thing; especially when they comencere the bornzon, and sometimes scarce any thing being by a stew degrees abone the horizon. So as I think that greatly need still at the stime to tropble the mathetic conce pt hereywith any more, for whose oke especially this labout was undertaken. A salor I would not wish the to be greatly scrapulous for the former error rising by reason of the sunney pure at al, or at least very hardly be observed by any instrument. But our land where we may have instrument. But our land where we may have

fleady flanding to make exact oblesuation, it would not alsogether be neglected.



Faults amended in the Lable of the

nation being fir figure and posting and confequently his eccentricitie and apogentness ceffly

Orwithstanding: the Sunmound
Starres are at fea she mole certain
marks and guides the Navigator
hathor herby homey direct hind
felto co trettific bid course of and
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triower where her is after many
at way, especially in long younges where

way se that way, especially in long votages whereid homey beforeed mady times by county withle
and values, to stog with the Port for many whoch
and moneths together, also down on any desire

Calmandique & andique ponture and to

Yet the Tables of declinations of the Sun & fixed Starres hitherto published, which I have compared together and examined by observation, are oft times very faulty: the declination of the Sunne in them set down being many times lesse than truth by 10, 11, or 12 minutes, especially in the moneths of February and March: and some of the principall fixed starres that are of most vsein Nauigation, differing in declination from that is set downe

in the Tables more who no mhole degrees as I

have been by many oblementoms.

For the eather enceding of their builts in the tables of the funnes declination. I shought it meete firstee its interest of the declination of every minute of the eclipake in degrees; minutes, and leconds, whereby the place of the funde is prefently knowne, his declination being first given by observation, and consequently his eccentricitie and apogeum were eafily found; and the theoricke of the Sunne corrected: out of which the Ephemerides he creatier following were calculated, the wing the rune place of the Sunne for everye days of source years agreeale, without nomble errour) to the true northe heatrens and our office with holpe of this Table of declination, a new regiment (prable of the Suns declination for rucry day of toute yeres) was most colidy made a tree from fuch curous as of berowith the ablashichertopublished and commonly wied have beene too much peftered: as by comparison of chisac theferables with the observations

hereafter following may suidens didivi Yesthe Tables of desisagent of the Sun & fixed hartes frierto published, which I have compared together and crambed by observation, are his times very laultys thed marion of the Sunne n them let down being many times leife than truth by 10, 11, or 12 minutes, effectally in the moneths of February and March: and some of the principall fixed flaires that are of most viein Nauiguion, differing in decliantion from that is fet downe



waguadrent of more then of the Table of Destruction following : mbereine fet the Declination of enery Minute of the Ecliptiche, in Degrees, Minutes, and Seconds: Made according to the greatelf obliquitie of the Zodiacke this prefere age, which by exact abservation is found to be 22. Degrees 30. Minutes. Serving effectially for finding out melt freedily, the true place of the Sume, his Declination being first knowne: Or, conwaring To find the Declination of the Same, bis place bemeridan alutude of the tunne was roblerated that

deg 78 min. whereto the oblemations of the 8 0.10

Geause the Tablesof Declination following; doothidiffer formething from the Tables heretofore public Thed by others, wherettome make thegreatest doctination of the Sun to born & Degrees 28 Ministeson 10 in Gopernical and his followers

(actording to which the Tables of Declination andsegirelent totthe Sunanow generally ried by due English Mariners memade) whereas others of late asthurinoble Astronomical Demante Tycha Brideda his felond book Donecter in the eshates hand apple the temperate to desler the fame to bee by his obfernantons 29 dend 27 minpage 38 23 des 1 mi. praga 386 28 des printigo des page 317 published by Affigure a I shought a shorter needfull to fet id que requir hat teritore monte il mette cleade neither to the one, nor the other, but to keepe as it west, smiddle counsabetweene both : herein not onely spreeing with that excellentant senion Germanie Esclide Region whom Bernel Minde Compared by R. inel od Deline en di Ghuindagreat Madinidatian alwogles bilates

chole rather to follow, then either of the other But refling also vppon many and diligent observations (taken by a quadrant of more then fixe foote femidiameter, fo exactly made & divided into minutes and halfe minutes, as possibly we could : and as accurately vied and rectified by aplumbine (enerie time we obferned) as fight could differne:) All which observations do proope with one conferm that the greatest declination of the hinne in this age is 23 degrees, and 30 minutes , as thus it may ap-

peare.

In the yeare 1594, the II and I2 dayes of June, the meridian altitude of the lunne was observed to bee of deg. 58 min. whereto the observations of the 8,9,10,13, 14 praired glayer of the fame moneth dog well agree, wherm the Meridian altitudes of the funne were 61 deg. 55 mi.; 61 deg. 56 mi.; 61 d. 57 mi. 61 d. 57 mi.; 61 d. 57 mi.61 deg.56 mi. almost, as also the observations of the9.11,10;and 12 dayes of lane, in the yeare 1 507 : In which daies the meridian altitudes of the funne were 61 de 57 mi 61 de 58 mi almost of de 58 mi 61 de 57 mi. By all which observations it may be concluded that the greatest height of the fun here at London is 61 deg? and 8 minutes. Likewife by diligent observation made the 12 of Decemberin the years 1 595 (which day was verycleate)is is manifelbehatche leaft meridian atorede of the funne at Londonic 14 degrees, 58 minutes, which being taken out of the greatest height, of degrees, 58 minutes, there temanoth 47 degrees, o minute flatice of the tropickers the halfe whereof it the obligative obthe redicate, or greatest declimation of the summers this time, wa. 22 degrees 30 thinutes. , valle outs non anna

il Bur yet further to fatiffie them that may perhappesbe in doubt hereof, because I bring but one observation onaly of the least meridian altitude of the funne melio may alle object the retraction of the farme beames, he ing A de A

foncare the boricon. I have also tried the fame another way, by many and heedefull observations of the Pole flarre, whereby I found the greatest heighethereof here at London to be 34 degrees, 24 minutes, and ; and the leaft height 48 degrees, 39 minutes ; the difference of which heights is a degrees 45 minutes : the half whereof 2 degrees 52 min. } (the distance of the Pole-Rarfrom the Pole) added to the lowelt heigth of the Pole starre, Theweth the heigth of the Pole at London to bee 51 degrees, 32 minutes : the complement whereof(38 degrees 28 minutes) is the heigth of the equinochial which Subtracted out of the greatest heygth of the funce. the greatest declination of the summe as 11 121 before 23 degrees 30 minutes. 5 59 0 29 31 9 53 49 1 17 43 0 14 13 1 18

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The ve of this Table.

This Table of Declination is made fo particularly to cuery minute of the Ecliptike, to anoyde tedioutnesse in feeking the parte proportional, when you would find out thereby, either the declination of the Sunne, his place being first given in degrees and minutes : or elfethe place of the Sunne in the Zodiake, his declination being first knowne by observation, for which cause especially this Labour was vndertaken, that hereby it might presently appeare how well the Ephemerides and Aftronomicall Tables hitherto published, agree with the truth of the heavens. Wherein many times no small difference is found, even the Prutenike Tables themselves (which have beene heretofore commonly accounted the most perfect in that kinde) dilagreeing welnigh halfe a degree from trueth, and that is the place of the Sunne, whose motion of all others is accounted most simple and regular, and most case to be found out.

To find out the declination of the Sunne by his place first given, by helpe of this Table, doe thus: If the Sunne be in Aries, Taurus, Gemini, Libra, Scorpio, or Sagittarie, seeke the signe and degree of the Sunne in the vpper Margine of the Table, and the odde minutes (if there be any) in the first Columne towardes the left hand: Then looke wherethe line proceeding towardes the right hand from the minute of the Sunne, crosseth the Collomne comming downewardes from the degree of the Sunne. for there you have the Declination of the Sunne.

Cincer Capricume

The

But if the Sunne be in Cancer, Leo, Virgo, Car pricorne, Aquaric, or Pikes, do contrariwile, that is, lecke the tighe and degrees of the lunne in the ne her margine of the table and the minutes (if there becany) in the last columns next the right hand; and following the line of the minute of the funne towards the left hand; and the columns of the degree of the sunne vpwards, in the common meeting of that line and columns you shall finde the declination of the sunne.

Example of the first of the first of May 1598, the place of the sun is in 20, dege 23, mi.8, according to the Ephemerides of the sun hereaster following; made agreeable to many exact observations, taken by a quadrant of 6 foot 80 a quarter lemidinferent in the yeares 1594, 1595, 1596, 1597.) Finding therefore Taurus 80 the 20, degree in the yeares 1694, and 23 minutes in the sufficient of this table, and 23 minutes in the first columns, I have in the common meeting (of the columns descending from 20, and of the line proceeding from 23 minutes 19 seathed eclination of the sum o

Example of the second. The spot August the same years by the same Ephemerides, the same is in one degree, so minutes of Virgo. Therefore I seeke Virgo, and t in the nether part of this table, and so in increas to the instrudumne towards the right hand afterding apwards. Then following the line of so minutes betwards, and the columne of one degree upwards in the common meeting of the line and columne I finds ten degrees so minutes.

day at noone for the meridian of London.

But the declination of the sunne being first knowne (by observation or otherwise) the place of the sunne shall most easily bee sounde out by this table after this manner. Seeke the suns declination in the area of the table: then if the signe wherein the sunne is (which you may for the most part easily know by æstimation) be in the head of the table, ascend vpwards to the toppe of the same columne in which you found the declination given, for there you shall have the degree of the sunne: follow also the line wherein you find the given declination towards the lest hande, till you come to the first columne lest-wards, and there you shall have the minute also.

But if the name of the figne wherein the funne is, be in the nether part of the table, you must doe all things contrariwise, descending from the declination found in the area of this table to the same columne, till you come to the lowest part theros, where you shall find the degree of the sunner and proceeding from the declination towardes the right hand in the same line, till you come to the last columne, where you shall find the minutes to be adioyned, that you may have the true place of the sunne.

This way of finding out the place of the funne by his declination, first knowne by observation, is then of especially se and trueth, when the sunne is neare the aquinoctiall poynts, for there his doclination altereth quickest, increasing or decrea-

201/16

fing

fing well nigh 24 mi. in 24 houres. But when the sunne is neare either of the Tropikes, the missing of one minute, yea or halfe a minute in observing the declination, may cause you erre an whole degree and more sometimes in the place of the sunne. He therefore that listeth trie how well the Ephemerides and astronomical tables hitherto published agree with the trueth of the heavens, had best make observation when the sun is in Pisces, Aries, Virgo, and Libra, where missing one minute in observing the declination, will cause you misse not past two or three minutes in the true place of the sunne.

When the funne is neare either of the equinoctiall points, there may tometimes become
small difficultie in finding out what sight the
sunne is in which may easily becauoyded thus.
The meridian altitude of the sunne increasing (as
in winter and spring time) if the height of the sun
beclesse then the complement of the poles cleustion, the sunne is in Pisces: otherwise in Aries.
But if the meridian altitudes of the sunne be cuety day lesse then other (as in summer and Aunumic) and the heighth of the sunne at noone
greater then the heighth of the sunne at noone
greater then the heighth of the springstial or complement of the cleuation of the pole, the sunne is
in Virgo, otherwise in Libra.

There may likewite bee some doubt in what signe the sunge is, being neare either of the Tropikes, which may be resolved thus: the sunne having south declination increasing, is in Sagittaries but if the declination of the sunne bee southerlies

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and

and decreasing he is in Capticorne. Contrariwise the declination of the summe being northerly and increasing, he is in Gemini, if decreasing he is in Cancer.

Nowe whether the declination of the fun increase or decrease, you may know by comparing the declinations of two daies togither. For if the declination answerable to the first day be greater, the declination increaseth a other wise it decreaseth. If both dayes have a quall declination, the first day the sun is in Geming, the second in Cancer, if his declination be northerly, if southerlie, the first day he is in Sagittary, the second in Canpricorne.

An example or ewoovill make all plaine. The eight day of Aprill, 1597 the declination of the fun was found by observation to be ren degrees, 53 minutes ; which I fee out in the area of this table, and in the head of the fame columne wherin I finds this declination, I docke 28 degrees of Aries (for in Aprill the funne cannot be in Libra) and in the fame line wherein I found this declination, in the furthest column towards the leschand I finde 17. minutes: Wherefore by observation I pronounce the place of the funnethe fame years and day to bee in 28 degrees 17 minutes of Aries. Which Miagnus following Copernicus and the Protenicall tables (as he proteffeth) maketh to be the 27 degree 57 minutes of Aries, that is, twencieminutes leffo then trueth, that equation alto beeing abated, which is answerable to the difference of long trude betwixt London & Venice, Line The

The ir of March the same years at London (where by many and diligent observations by large and feueral instruments, the heigth of the pole is found to be 51 degrees, 32 minutes (the meridian altitude of the fun was exactly observed to be 38 degrees, 49 minutes: whereby it appeareth that his declination the lame day at noone was o degr. 21 minutes, & that northerly, because the heigth of the fun was greater then the heigth of the aquinoctial. It is plaine therefore that at that time the fun was entred into Ariesi But now to know how farre he was entred : tecke out o deg. 21 minutes in the area of this table : wherewith you hall also find in the same line in the columne herestroletchandes minutes, and in theroppe of the columneright over this declination you shall haue o degree. Therefore it is manifest that at that time the fun was in o degr. 53 minutes of Asies. Where Marinus after the Pourebick account maketh it to be in o degr, 25 minutes of Aries chat is, 18 minutes wanting of the trueth found by observation.

The like difference I have often found by manie and deligent observations, especially for the space of thele foure yeares palt: the whole catalogue of which observations I thought good (for thy further lansfaction herein) to set downe in a table: fafter I have first showed with what instrument and in what maner I observed the same, that ifany error herein bath beene committed, it may the

more cafelie appeare.

The inftrument therefore wherewith I obfer-

ued was a quadrant of more then fixe foote femidiameter (for the roome wherein I was to vie it, could not well admit a greater quantitie) which by realon of his largenelle was so exactly made and divided, that both minutes and halfe minutes mought therein be easily discerned. The limbe and sides of the quadrant were about two ynches and a quarter in thicknesse: the breadth of the limbe about soure ynches: the breadth of the sides

about two ynches and an halte.

In the midft of theendes and of one fide of this quadrant were two round holes made, in either end one: whereby the quadrant was hanged (like a gate on his hinges, vpon two round pins, fitted to those holes, and fixed in the ends of a couple of lockets, put dole vpon a ftrong fquare polt, perpendicularly erected, and the upper endethereof fastned to the fide of a principal sparre in an vpper chamber, where a window (according to the reclination of the roofe of the house) was made betweene it and the next sparre, in such sort, that carrying your eye along by the circumference of the quadrant, you might by the center therof placed at the window, fee any part of the heavens neare the meridian, betweene the zenith and horizon. The nether end of this post resting on the flore was put into the midst of a socket nailed to the flore, which was so wide, that on everie fide the post wedges might bee put in to coune it at pleasure this way or that way, rill the side of the quadrant were found to fland most exactly perpendicular, by the hanging of the plumbeline alalongst

longst most pracifely upon aline parallel to the zenith line of the quadrant. To the center of the quadrant was fastned a strong ruler of one ynch in thicknes, two ynches in breadth, & almost 6 foot and an halfe in length, carrying two fights vppon it (viz. at either end one) of equall breadth and length, the end of the middle line of each fight falling perpendicularly vpon the middle or fiduciall line and plaine of the ruler. Through the vpper fight placed at the center was made a square hole as great as well could be. Through the midst of this light and hole was put aftraight wire, erected perpendicularly from the fiduciall line and plaine of the ruler, and so much of it made flatte and thin, as was betweene the toppe and base of that fquare hole. This wire ferued for observing the starres, the flat fide whereof was to be turned towards the eye in obseruing of great starres, and the narrow fide or edge of it was turned to the eve ward when smal starres came to be observed. Through the midst of the nether fight, (from the toppe of it to the base thereof) was made a natrow An perpendicularly, erected likewise from the fiduciall line and plaine of the ruler and quadrant. When I observed the startes, I looked through this flitte, elevating and depressing the ruler, till the ware (beeing first fitted to the bignesse of the flarre) did euen couer the flarre from my fight:in fuch fort, that I might fee both edges of the flarre alike on either side of the wire. The square hole in the fight had a couer fitted to it like the couer of abox wherwith it was wholy couered when the Sun 9111.

Sun was to be observed. The nether ende of the ruler carying the sights, was to be safted with a scrue pin, at any part of the circumference of the

quadrant as neede required.

With this quadrant (alwayes rectified by the plumbe-line in time of observation as before is shewed) the height of the Sunne was most easily & exactly observed, by turning the quadrant this way or that way, and cleuating or depressing the ruler carrying the fights, til the toppe and fides of the hadow of the vpper fight placed at the center, fell vpon the nether fight placed at the circuference aquidiffantly from the top and fides therof: For then the vpper edge of the ruler hewed præcisely the height of the Sunne desired in degrees and minutes your the limb of the quadrant: fauing that one whole degree was alwayes to be added thereto, because the breadth of that part of the ruler that lay vppon the limb of the quadrant was made to be just equall to two degrees that is on either fide one degree from the fiduciall line.

Now for finding out the meridian altitudes of the funne and starres, I first found out the meridians line thus: with the quadrant rectified and yied as before is shewed. I observed the height of the Sunne in the forenoone; and so warily letting the quadrant stand immooueable, and laying the side of a streight ruler (that was about seven foote in length) close along to the perpendicular side of the quadrant: close by the end of that side of the tuler (touching the sloore of the chamber) I made a pricke ypon the sloore. Also laying the side of the

vpon the floore, defetytheour Notwithstanding there is some limiter set to a: Appeledocum paids; falsoni bright liberalise periode de concentrate de concent fernationi Librarie inche indene em (che utile of the quadrate cuty togethe fighter being the factor place is to see to the factor of the Sunner came worke fame Heig when to blonged have forencome per ingthemotive of the Sunmous of the Sunmous of the Adoroished allow of the appendig to the population of the considering the soul billion of the considering the soul billion of the constant of moucable, and drawing the line at the tolish of the floore, and sunnes azimuth, in time of the afternoone observation, in like manner as I did in the forenoone, ferring one foote of the compafles in the interfection of those two lines, with the other, drawing an arch, to great as I could betweene the same lines, and finding out the midst of this arch, a line from the centre drawne, by this midst was the meridian line: ouer which, with help of a long ruler layd to the vpright fide, and limbe of the quadrant, and extended to the floore distribution of the state of th

Notwithstanding there is some limetre table difference, which if it should be enducable, and drawing the Diesethed to Einis ad the floore, and funnes aximush, in time of the afternoon; observation, in like manner as I did in the forenoone, ferting one foote of the compaffes in the interfection of those twoo lines, with the other, drawing an arch, so great as I could besween, the lame lines, and finding out the mildft of this arch, aline from the cooree drawne, by this midft was the meridian line: ouer which, with help of a long ruler layd to the voright fide, and limbe of the quadrant, and extended to the floore

A Table of Observation

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29 Frid.	15	- 95	30	01	I	81	37.	.hpo	16 M
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20 Fand.	15	25	23	3	10	55	10	16,	39
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9. 55	78	1	96	33	39	F	8.8	35	34
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4 bound	15	74	45	19	38	11	环	38"	T282
8 Steur.	n26	46	11.	42	29	26	28	· Sign	-241
1 Same	20	18	8	-83	18	80	1	191	3
to Sund.	22	13:	05	17	87	-58	08	500	96
17-Mond.	20	84	44	33	9	28	91	190	126
21.214	1	34	16	14	12.	18	95	स्र	381
27.7 but	-33	14	9	#	18	-16	37	50"	30
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12 Moto	37	14	11	46	63	830	0	Y.A.A.	148
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2 Sature	1	47	18	19	32	44	31	430	MOI
6.10	57	75	19	3		100	64	上8年	1141
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21 Sund.	15	10	23	54	12	37	12	351	164
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D Thank	16	34	21	54	20	42	20	11	31
3 Satur.	16		21	35	22	42	22	14	28
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12 Mond.	13	39	19	48	91	48	58	23	25
14 Wcd4	19	8	19	200	B	52	13	25	374
22 d hugh	27	14	17	14	12	(2)	14	320	129
14 Wc4-8	21	48	10	40	-14	9	13	30.	77.3
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II Day	DOE:	Murit	A6 1	40		7/	2 3	101	44
13 Frid.	28	29	9	59	-	12	17	44	281
7 Tuel	19	10	-8	福	CB	44	-8	45	125
18 Wed.	30	377	-	50	11	12	34	45	27 4
S Wed	33	7	5	27	16	11	15	45	281
26 Thurt	33	24	-5	4	87	13	16	45	27
29 Sund.	34	341	7	537	20	11	19	44	27
March	21							12011	
Sat. S	39	43	15	14	11	40	12	39	77
A Sund	40	6	1	38	4	8	1	38	28
16 Tuck	40	52	3	24	6	2	1.0	17	25
April	11	40	-11	1 4		1 5-	-	1000	
20 Tuef.	53	23	14	55	IO	12	9,	"Fitn	21
24 Sar.	34	35	16	7	14	7	13	44	23
25 Sund.	54	517	16	23 5	15	3	14	420	1201
26 Mond,	55	8:	16	40	16	34	15	40	211
28 Wed,	55	41	17	13	17	56	17	36	20
29 Thurs.	55	57	17	29	18	.53	18	34	19
May	T Q	A	10	TOT.	2.3	84	2.1	195	148
4 Tuck	57	13	18	45	23	n 43	23	T 24	19
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lune			· C	1				1.01	-
15 Tuel.	61	P. S. Marian	23	26	and make the	911	3	\$ 39	32
18 Frid.	61	47	23	19	6	57	6	31	20
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24 Sat.	7.22	56	17	28	Service Visit Co.	0	Po	56	13
27 Tuel	55	and the same of	16	40	14	-	13	49	720
29 Thurs.	54	The state of the s	16	16.	15	56	15	44	11
30 Fra.	134	17	15	32	17	53	-	39	- National States
31.040	54	1	137	- 35	+	40	1	132	-

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3 3 9 6	Ser.	Male	TAN	of land	de S		Same	by she	B 38 .
August	SALE.	-	10-m	ON ONE	ab (er	eation,	PRES.	643.	2
Dayes	Des	Man.	Deg.	Min	Deg.	Min	Deg.	Mao	Min
e Tues	50	33	12	21	37	28	37	1.17	111
2 But 2	19	19	11	23	92	- 34	00	Ib	/10
& Mond.	48	48	10	20	\$3	to	1.5	.1.5	PI.
in Site !	47	81	08	33	83	15	63	55	10
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agramber	27	17	28	53	0"	115	0.5	,bil	18
TISORL "	41	22	63	54	22	41	32	3 L.	10
6 Mond.	40	59	2	31	23	41	23	30	11
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8 Wed.	40	12 1	L	44	25	38	25	27	TI
3 Monda	88	1PT	70	95	.0	10	,0	71	16
14 Tueld.	37	52	0	30	5.7	30	10	18	Sec. 2
15 Wed	37	28	· P	6	53	30		9	12
Silver	33	34	14	73.	14	134	13	8	15
27 Mond	43	44	7.7	84	114	30	14	- Free	2.0
Ottober				-	-	12	21	3	13
4 Mogd.	30	1.2	18	19	11	16		han Am	-3
Nouember	22	20	22	222	21	14 6 2	20	3	19
2. Tuelc	30	35	17	10	20	25	23	4	21
5 Frid.	19	47	28	100	75	>	20	ha	2
E5 907	101	105	Oi	255	7.	100	-35	blog	
Lanuary	61	10	16	-	10	~ 46	17	320	26
25 Tuel.	72	74	74	54	10	11	10	22	29
March	35	1	07	UT.	4.	200		10.0	70
March	30	40	0	21	0	52	0	.250	78
17 500	30	12		45	1	53	1	125	28
TAS COM	120	26	-3	82	2	62	7.2	24	28
14 Mond.	70	0	1	22	7	51	3	23	28
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1 10 miles	7 h S 800	W. W.	***	100 m	70 Vo	NEW Y		og of	201
March	AN HOO	Merry	13 Jan	no ven	Merra	aile o	2/20	bles	Min
	Deg	NW F	<u> 연</u>	Min	CF	- NO	02 1	31	261
151 Tueld.	OP OP	28	02	18	15	98	9	220	261
171 Theil	18	90	€2	42	06	48	86	19	(201)
son Sunda	42	21	83	11	70	48	10		129
Mond.	42	94 GA	17	49	4	17	£	351	115
8 Frid.	40	21	10	53	28	17	27	157	126
Sara Saca	35	19	17	.41	19	37	19	18	IP
I Maie	55	41	23	31	2	59	00	14	120
2 Mand.	18	40	18	12	21	34	.O.M	Asse	8.0
Tutte	(4	05	92	46	97	154	29	F41	13
9 Thurf.	61	98	12	26	0	22	29	35	
12 Send.	61	58	13	30	1 6	3.5	0	33	731
13 Mond.	61	57:	53	94	71	39	\$9	30	VIS
10 Sand	.61	28	13.	100	1			Tool	1307
a Mond.	60	73.	19	21	21	24	91	330	11
Z Tuel.	60	3	21	35.	22	39	22	310	118
6 Wod.	99	54	01	20	723	36	93	28	नर
8 End	59	34	17	33	10	50	THE REAL PROPERTY.	42	18
24 Sand.	56	20	17		12	ST THE PARTY OF TH	12	37	Character in
August	1	64.	17	6	21	19	13	150	1 7
2 Wed.	53	11	1	143	30	79	20	18	170
o Tuesd	and the last	16	13	48	26	492	188	4 15	HIT
September	1 54	80	1,	1 58	0	178	PB	57	1615
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24 30	3	1	3	7.5	+	-	104	-	1

of the altitudes of the Sunne.

TOTAL STREET	1-3-4	的 14.24至6641993	1.0.11	
De la company	4 85 16 50	Tada File	wording of the place of	2 4 12
ואפעאלוונים	I DOWNSTRANSPORT		Made alle des de	Min.
श्रिक्षका	tween the	mained b	orthogzodiack co	1
De Sterle	101. 105	o Horne	48. 48. demonstrated	15
SA FUEL	179d 34	d hour side	ald mostly los 45	16
FT			office on sai 46	19
29 Sat	21 46	Ha Ath	14 3117 Just 47	20
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Mont	190 610	19 de se	35 var 3 1240 50	21
TILLIN OF TO	10 24	32 4	10 1,25 191 1	24

Refly appearet in that the declinations let down in the registration of the himself had are, at have been hitherto ordinarially led by our feet inch. doo for the most part notably erre from the street of the heatiens. Which errors as they may most cruly be corrected by observation only to those dayes wherein certaine observation was made. So for finding our the declinations of the middle dayes between the observations and their to finde out the declinations could easile to the places of the tunne for cuery day of some waste declination the funde. And the lame declinations was the meaning of the finder. Because that after that number of years the meaning applied without sensible error which also by a certaine equation may be corrected, to as these tables may thorough the street ables may

Hh 3

First

First therefore for making these Ephemerides it is needfall to know charine of the sunner on trance into certaine special poyers of the Zodi ack: as also the sembles continuance in the arches of the zodiack contained between those poyers whereby the proportion of the sames morion may geometrically be sound ont. His except script and place of his appropriate being hereby knowner.

febraicings ofthe Si

For knowing the time of the funnes entrance into any point of the ecliptick, it is best to observe exactly the meridian altitude of the sunner not onely the same day wherein her is like to enter into the poynt desired, but every day also, for two or three dayes together, both before and after that day, that both by the restimouse of so manie observations compared together, you may bave the more allitred truth as also that if the day, you most desire fall not out to her so cleare as you would wish, you may not with landing, by the observations of the dayes going before, and so lowing after, or either of them, obtaine your defire.

Having thus oblamed the meridian alcitudes of the funne and thereby allo found his declinations for every one of those daies whete is you obtained, you shall eatily know allo the store place of the sunne in every each one, at the same place of the sunne in every each one, at the same dayers with heipe of the former table of the declination of everie minute of the religious and with increase before was declared and when the Table.

Now it relations to happyly that both the day

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OC

2.

Phosis As the subport of the property of the definition of the def red poyer of the ecliptick, at that the place of the funge sup werable to she declination of that day, be alone with the point defined you have already that you lought for without any more adoor viz that the funde entreth that day at moone into the ponis defired. Otherwife subtract the obserued place of the funde, next before the point defired pur of the obletued place of the lume, next following that point, at the remainder that thew you the apparer motion of the funne, answerable to the time between those observations Submack alfothe former place of the funne, tio his place in the poyor defeed; and note the difference for as the former temainder (that is the apparent thous on of the furne betweene the oble untions) is to the time betweene those observations: so is this difference to the time betweene the first oblerna tion, and the humes entrancemen the poynt des tis about to mantes, it appearet bard

Example of the first: I defired to knowe the time of the sunnes entrance into 14 degrees, o. min. of a in the yeard 196 I observed therefore (at London) the height of the sunne at noone, the 17 of July the same years, and found it to be 15 degrees, 8 minutes, whereby his declination was gathered to be 16 degrees, 40 minutes, and consequently his place in 14 degrees, o minutes of exthat day at noone.

Example of the second: admitte you woulde know the same years the time of the sunnes entranceinto the midst of Taurus. Hauing therefore

forbadelier endobserved iche meridian altirudes of the funny the and by and us dayes of Marill, in that yeard within the house of which dayes I am degratomin. 14 I founds hereby the places of she funneshedamedayes to be sa they with the u depices siminara de degracia quinta diberie ting therefore and dogoces, 70 min; to the the the what place of the funne theza day) oncot soder, 3 mil o .the place of the fund the zaday) relie le thathdeofiall be salminal which is the apparent agost enofche lenne bervicem the appraid applayes a moone, that is, the diurne moviobroffile finleere that time. Subtracting also 14 degrapations out of sy siderio min. wathe difference is 93 mit Now as sois to ss: loareiza hourses no: à a didure, and that is almost 43 minutes. It appeareth there for by dubtracting at Houses 43 min. our sit 4 houses, that the fune hould enter into the midit of which says about one bonze and in miniber foremannentha is at tempolocker (and us thin) such roubledo roe you bed I guile gail and be observed sheat day, I may normith flanding bord thatime of the lunnes entrance into the midft of May the observations of the a4 & 26 daies after this manner: Subtract 14 degree printing the bf 16 degrees, spin he the remainder widh be buc degree 64 min that is the motio of the finne for swood dayes betweene the 14 and 126 dayes tat forc BOODC

notice Therefore some sold build, fr to 48. Houred the stepped alternate is the difference of the place of the difference of the d obleroe both before and after the time of the columns comming we the populationes y select pole Tedula nothane obstraed the varday , but onely the 25 and 20 dayes, in both which dates the funite is gone partitle poynt delitely not with transming your may oblempy our defice throng Subtract 15 deg. 3 min. & (the place of the times the lunde the 26 day) there will remaine 38 mile the distactmenton of the futine betweenother nooneddes of the 29 and 28 dayes I Now ber cause that on the 21 day at noone the sunne way gones min pall the poynt defired : therefore as 38 miniate to 14 houres, fo are 3 min. to 1 houre, 14 milli and almost a balte. By this account then the lunne fould enter into the midit of Taurus the by day a noure and about 14 min, and a before noon: that is, at 10 of the clock and 45. mi. 4 Weither ought that fittal difference that appeares becweene their secounts to be greatly regarded, which amounts not so formuch as half an houre in the sum of the sum of the family that the sum of the

part of the zodische cannot alter fo much as i of minute which is follow by lense verie Bue this diffehardly, or not at all be diffe rence may with good re er ferue to conpulofity of them troll the overmuch quacus he that will needes bee calcula rion the place of the funne not only cordegrees and minutes but to fea great many minutes of the trueth, and with all the instruments and meanes they can devise, that have much adoos to finde afforedly the true place of the funne within paeminute, yea cuch then, when her is as, or marcube aquinoctiall poyers where of all others his placemay most

Neither yes ought shat little difference of a minute or two that appeareth betweene the diurne motions of the funne, found by obscrustion greatly moue any man(in that by the first and fecond observations the diurne motion should be 56 min. by the first and third 5 7 min. by the fecond and third & min.) the greatest of which differences may almost arise by exting but one halfe minute only, in taking the height of the funne, which error is in a manner altogisher infonfible and wil be eafily perdened by them shar have or shall secusione themselves to make she like obleruations when belides their owne on perience they hall finde that the chocker artificers in this kindnotskill. Tache Brahe de recentionis of her eignen di phoneus le his sub de Jacker Genere Fend libr. 4 cap 11. and Ptolemee himlelfe in all his his Catalogue of the fixed startes Almagest.lib.7.

cap.5. when they shall finde (I say) that even these princes of Astronomie so greatly exercised in observations, since accounted an whole minute or two hardly sensible. Prolemee also contenting himselfs, for the most part, to have set down the places of the fixed startes to sixth parts of degrees, and verie seldome comming to twelsthe parts, thinking it sufficient (as it may seeme by the perpetual course of that Catalogue) to come

within for io minutes of the truth.

But to returne againe from whence wee have a little digreffed: After this manner nowe thewed, wee founde the time of the funnes entrance into the beginning of rand a, & into the midft of a.o., m and a, as into places feruing most fully for the finding out of the lunnes eccentricitle and apogrum: following alfoherein the experceiuing how hard, yes tather impossible a thing it is to finde by observation the time of the lumbes entrance into the folfitiall poynts (where the meridian altitudes, and declinations of the funne continue almost the lame, without any sensible difference for two or three dates together) chole rather the parts of the zodiacke alreadic mentioned, where the place of the funne may more truly be known by reason of the quicker altering of his declination, the difference thereof in the space of 24 howres amounting to more then 17 min. The times therefore of the fundes comining to the forelayd poyntes in the

yeares 1594, 95,96, 97 wee found to be fireh as are fet downe in this table to lowing.

	1594	1 595	1 1596	1 -1 1 197 1:0 in
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Ian. Mar.	Salance	24 17 1	924 23 25	5 59= 15
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Hereby the times of the funnes continuance in the arks of the zodiack betwire those points, as also the arkes of the eccentricke auniwerable to those times, were more easily found then that it should now be needefull for mee to be turber excious, in letting downe the manner of finding the lame, wherein norwith landing there may tome difference of an house or two formes times appeare, by comparing together thole as may arile by missing little more than one minote in one obletuation of little more then halfe a minute, in two observations of the meridian altitudes of the lunne (one observation being made when the lunne is about the begin-Bing of the arke, the other, when he is about the ending thereof) I make no doubt, but that it hal at the least be tauourably centured by them that have acquainted themselves with often practise of observing: wherein he shall (in my opinion)

quite himfelfelyandendus aveil o who heyther through imperfection of fenfe; either in making ordiniding rocihacetifiting rociaving his inftrumentyant energy pastichereof a dor through the difficulty of burying przcifely the edges of the fladow of the upper fight falling uppon the nether dibelimites or boundes of which thadow are but a confuled mixture (as it were) of lightand darkenelle together, or a meane zqually compounded of both the which can no better bee diferrhed than by ghelsing:) (nor yentprefraction of the funne beames through the thickeneffe of the ayees the pecially when the Surineis in the fourtherly femicircle of the zadie; acker beothall (I fay) quice bianfelfe very weller this meritice by anci, nor forme; morall of chefe. thall mife aminute and more to mistimes andbal ferming the Meridian Altitude of the Sunne to whereby if ectour be committed both at the hon ginning and anding of the formay herkes felpe cially of those arkes that are conscioud between the middels of Tauris and bed sof Legand Scorpio of Scorpio and Aquanius of Aquanius and Tourus) the place of the Sun sound by such observation or may be more or lest then fructh by 3 or 4 minutes, 86 both circus togethers may amount to 6 or 8 milettor in the motion of the constant entitle no sydetypes farodis, and time of the fire shiding in each fabele takes im -Ducof the former, while kind the time of the four continuancous that portherly demiciscle of thereliptick from the beginning of transche ha gianing li 3 do min.

ning of Librato be 186 dayes, 14 houtes, and a bout one half: and in the fourherly definitive for Librato Anies, 178 dents, 17 dioures, 18 days, 17 dioures, 18 days, 17 dioures, 18 days, 17 dioures, 18 days, 18 dents, 17 dioures, 18 dents, 17 dioures, 18 dents, 18 d

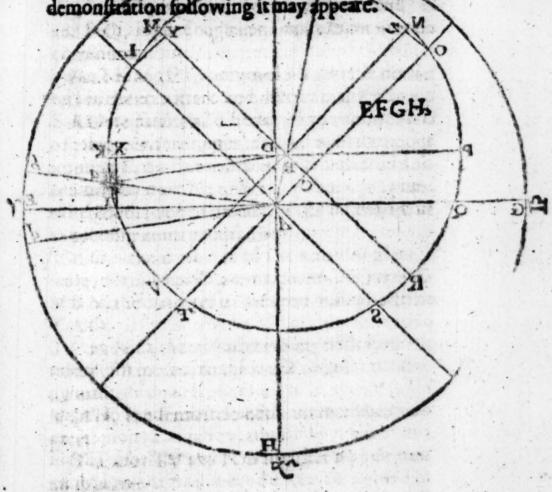
Therefor because the place of the sinne being ar, or neare, the equinoctial poynts, is most cercainely knownerhis mendiahalticude and declination altering there most fwiftly band confequently theatks of the eccentrick contoined betwist those poynts, are most certainly found: it appeareth to be most certaine, that the eccentricitie of the funcat this time, must needs beat the lealtgares fuch parcs whereof the femidiameter of the eccentrick containeth shood though the funder apagamin were but the beginning of Gander. Whereas if it be in a degbeeshus min of Cancer (as experience would have re) the eccenenditie cannot bedleffe then 346 of the fame pares notwithstanding hee maketh is to be little more thengas of shole pasts in this age, ben

But finding by the observations of the yeares 1596,821597, that the sunne is ingoing through the quarter of the zodiack; from the 150s Aquarative the 150s Taurus, 50 dayes; 23 houres, 22 min. and through the negrobalizar from Taurus to Leb, 94 dayes; 22 houres, 25 min. and consequently that the arke of the eccentricke answer table to the first of their quarters 4 is 89 degrees

li 3 gianing

40 min.

fo as the whole arke of the condition and we have been the to the femicircle of the collection from the 15 of Aquarius, to the 15 of Leo, in 182 degrees, 26 min. It followeth hereof, that the place of the funnes apogra, this preferrage should be about 6 degrees, 50 minutes of Cancer, and the eccentricitie almost 344 of the forestyd parts, as by the demonstration sollowing it may appeare.



EAG.

40 minutes and the leconsisquisosdes HORES. - M Ni Revi, shoreceon rick of the film devent as of he to the femicircly sights silve to messadic As of Aquarins, to the inclusion of hereof, that the place of the loues apogad; this preference (hould be about 6 degrees, sominues of Canter, and the secrentricitic almost was of the forcing ation belowing it may AIG

HAG, the diameter of the ecliptick, drawn from aries to Libra O a record to Cardia National KBP, the diameter of the eccentricke parallel LAS the drameter of the centick dr. DAE or IK MNPQ . thearkoof the eccontrick from the beginning of Aries, to the beguining of Libra 183 degrees,55 minutes. KMNP, the femiencle of the eccentrick, 180 degrees. Therefor the arkes of the eccentrick, I K and PQ, joyned togither, make three degrees SS minutes in all to tlad and all amo But I K and P Q are equal, because the diameters of the eccentrick and ecliptick KBP, and EA Gare parallels, Therfor IK is the one balfe of j degrees, sminutes, that is, one degree, 37 minutes &, the fine whereof I X æquall to A B. is found by the table of fines, to bee 341 parts, whereof the femidiameter of the eccentrick of whole fine conteyneth 10000. TAO, the diameter of the ecliptick drawne from the midft of Aquatius, to the midft of Leo. V B N, the diameter of the eccentrick parallel to TAO. TVM NO the arke of the eccentrick from the midft of Aquarius to the midft of Leo, 182 deg. o copos and B A che fe, and or banda 25 VMN, the femicircle of the eccentrick 180 depares, hereofD A is supposed to contein issain -geTherefor TV and NO togither are 2 degrees 26 diminies), 500, 01 10,000 125 1010 E BooTV and N O are aquall, because TAO and VBN are patalicle. Therefor NO is the Kk -101 one

one halfe of a deg 26 min. that is, one deg 23 mi. the fine whereof O Z æquall to C B, is 212 parts, whereof the whole fine content to 200.

LAS, the diameter of the ecliptick drawne from the midft of Fauris, to the midft of Scorpio.

MY BCR, the diameter of the eccentrick pa-

rallel to LAS.

LMNO, the arke of the eccentrick from the midft of w to the midft of a, 92 degr. 46 min.

degrees ?? min son

The arke of the occentrick MNO, 91 degr. 13 mi. because it is the one half of the ark TVMNO Therefor ML, the difference of LMNO, and MNO, is 1 deg 33 mi. whose fine LY, (that is) AC, (because MYBCR, & LAS are parallels) is 270 parts, whereof the whole fine is 1000.

Now then the triangle BC A, two lides being given, C B212, C A 270, with the right angle B C A, by the doctrine of triangles there shall also be given the angle B A C, 38 degr. 10 mi. which subtracted out of the angle C A D, 45 deg. 0 mi. there remaineth the angle BAD, 6 degr. 50 min. which sheweth the place of the suns apogeum in Cancer.

Also A D being found before so be 3415 parts, whereof the semidiameter of the eccentrick conteiners 10000, and B A the secans or hypotenus aunswerable to 6 deg 50 min.conteining 1007 parts, whereof D A is supposed to contein 10005 as our of the canon of table of fecans is may appeare. Therefor as 1000, is to 1007, so is 3415, so 3447 (almost) which is the recentricities of the sum exercentrick, in such parts of which the so-

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midismoits of the weether it is 1000. The lame may otherwise be prouedafter this manner: Inche Triangle BCA, the fides BC and G A were found to becare and 270 of the forelsid panced. The fquares of these sides are 4944, and 72900, The fum of these squares is creins formers apor aum, call which error may aout after ints manner: nunezodiacke. in the center of the ecoth line draw of from the center of the celiptiek, or of the world parallel to Par hewing the A b, aline drawne from the center of the 6-· cliptick Kk a 117844

Mā

then 242 which is the quantities of the third lide of the tame. Triangle B. A. the Ecocheticitie deficed, But because I might cassly each smore the one or two of these parts in sinding the cocentricities, and more then half a store menutes in the place of the sunnes apogram, (all which error may arise by missing lesses then halfe a minute in obseruing the mendian attitudes of the sunne) I thought it good therefore no to be two scrupulous herein: but so making the Ephemerides following, I tooke the eccentricitie to be 343 parts where the semidiameter of the eccentricities of the sunnes of minutes of Cancer Meaning also to come so meare Copernicus as trueth would gine me leave.

The eccentricitie and apogram of the suspensing thus knowne, angulars with his true place, which by so exact observation as we could, is the yeare 1597, the 1101 March at noone, we found to be o degrees, 3 minutes of Aries: his middle motion from the beginning of Aries, and his motion of Anomalic counted from his apogeum, were easily also found out after this manner: Let a be the place of the sunne in his eccentrick, the sunnes true place in the zodiacke.

B'a, a line drawne from the center of the eccen-

Ad, a line drawne from the center of the ecliptick, or of the world parallel to Ba, shewing the middle place of the hume in the zodiack.

Ab, a line drawne from the center of the c-

dipricks bythe tennenof the funde to the zoils ack, hewing the ample BAD being y degrand confoquently she hagte BAD being y degrand confoquently she hagte BAD or dega because DAIL SANGHARDERANDE Angle and Expounds by oblemusicated becoden is mi) being lubular sed from through BA Is there thalf compine thatfame, which taburated from Bb, the rue motion of the fun diat is, 53 min (adding there to an whole circle, the that remaine the middle and before to be 96 de dakkybe whole ang e B A d Maris Read dare farallels) and deg Babecause Baand the out of so degr. hall whee Anomalie of Bodes made for the mein Wwhich different tro or, demidde moe 3 & degr. 31 min. and the more of the gus min The difference that we found by obtamation, neglecting the o ofaction for the divertice of meridians, is at his and the difference of the funnes motion of anomany deg. 40 min. econck refles therefore April be fitted for the making of the aphemerides following onely Kk 3

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the angle B A apin the stange Wha of deg 7 lebeing grue, all rootopens, and Ba appender tame parts. sherefor by the dollhine deathing les the angle B of Appropriate Ala O (bear of Bestant Ad Interrallely that likewise by found so be degree of (the profthaphacelis or a quation of the furine at thatkime, which subtracted from Eb, the true motion of the funne that is,53 min (adding there to an wholecircle, there that remaine the middle motion of the same EFGH 4, 358 deg 56 min. Also the angle & Abyrdeg. 57 min added to the angle A B (found before to be 96 degr. 7 min.) hat make the whole angle B A d that is the angle Ba,because Ba and Adare parallels) 98 deg. Amin, which subtracted out of 360 degr. hall leave the aske of the eccentrick, R V a,261 deg. semin.the motion of the furnes Anomalie. But by the prutenick accounts made for the meridian of Mans Regids Bornfihe, which differeth fro vs in longitude to the eastward 27 deg-30 min.) the II of March arnoone, 1997, the middle motion of the lunge from the beginning of Aries, should be 358 degr. 31 min. and the motion of the funnes anomalie 258 deg.16 min . The difference therefor of this middle motio of the fanne, from that we found by observation, neglecting the g quation for the divertice of meridians, is 25 mi. and the difference of the funnes motion of anomalie 3 deg. 40 min.

The prutenick tables therefore shall be fitted for the making of the Ephemerides following, onely

Kk ; the

only by adding 25 mi. to the fannes middle motion, and 3 degr. 40 min. to his motion of anomalie.

Moreover, because in the prutenick tables, the greatest prosthapheresis of the lynne, intime of his least eccentricitie is one deg. somi 40 les & the greatest excesse) to be added when his excentricity is greatest) 32 mi.44 sec. Also the greatest prosthaphæresis found agrecable so observation in this age, t de. 58 min. exceeding & de. 50 min #1 fe.by 7 mi.; almost, which have almost the same proportion to 32 min. 44 fec. that 13 have to 60. Therefor adding alwayes to the prostapharesis orbis, found in the prutenick tables parts of the excesse adioyning, which may easily be founde by multiplying the excelle by 13, and digiding the product by 60 we shall have the profthapherelis to be added to, or subtracted from the middle motion of the lunne, that lo his true motion may be found.

One example will make this more plain: The first of Ianuarie at noone, 15 99, the middle motion of the sunne, reckoned from the first starre, of the constellation of Ati Ser. Deg. Min. Sec. es, gathered out of the prutenick tables, is 4 21 56 35

The lumme find be the	Sex. Deg. Min. Sec.
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23	13 47	14 59	12 43	12 55
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25	15 49	16 59	14 41	14 50
26	16 50	17 59	15 40	15 48
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The vse of the former table, on regi-

His table of the funnes declinations as a differeth nothing in forme from others that have beene publithed heretofore to likewife the manner of ving it, is altogisher the same that hath beene accustomed in former tables of this kinder failing that I must give warping of one lembe that bath beene committed herein, Which is as I have observed, that some of our fes-me do take the funnes declinatio out of their regiments without any equation by addition or subtraction of the part proportional agreeable to the difference of longitude of the place where they are, as if they were alwayes at the same place or under the same meridian, for which pheir eggiments were made of for which cause alone (though they avoyde al other errors) it may to fall our that shey may be descived femerimes to octa min. (or more in a long voyage) in taking the funnes dechuation. For there is not any nable of the funnts declination but that it must needs be made for some one meridia (as this former table was made for she meridian of London) and therefor cannon be truely yied funges

the diffrance of the annual and or difference of longitude.

To anoyde this error therefor, first learne hoseemoch year differ to longinude from the place for which your table was made, (and though you mille halfe a dozen or halfe a score degrees herein it cannot in this case breede sensiblechory Secondry hode overthe definence of the fanties declination agreeable to the page of 24 hours about the time of your object action: which you har doc by comparing the declination anniwerable to the day of your observation Willand declination of the day next before of ther, and to breezing the lefter declination out of the greater, for that to main exhis the diffe rence of declination fougheron. Thirdly as 360 is to this difference of declination, fo is the diffefence of longitude to the part proportialorge duation of the declination; which admation is to be added to the declination of the day of obfertation if the declination of the funde be evthe increasing se the place of observation westwarde for cla decreating undale place of obferla 1981 eaftwards from the place for which your eable of declination was made p otherwise this equation is to be subtracted from the declina tion of your day of observation; that you may haue the true destination of the funne for the time and place of your observations flore iseds

But if the vine of your observation be the nooncride singuediarde before on after the 002 funnes

funnes entraduce into eyelier of the aquinoftial points; you must follow another rule, and that is this:devide the difference of longitude by 150 marke howe many unities the quotient contey? neth, and formany minutes adde to the declinar tion found in the former table, if you be exther eastward from the meridian of London, and obferue the moonetide before the equinoctium or if you be woftward from that meridian and obforue chemooneride after the zoninochium for the fund that be the declination defired Otherwife if you be exther theft want from the meridian of London, and observe the nooneride next befrancishe aquinolitium of eastward from that meridian) and observe the day immediately sher the equinoction compare the declination found in the rable with the forelaid quotient and lubiratt the leffer out of the greater for that remainment dedination defired Which declination lkatho the fame denomination of north por fouth that the table howeth if the quotient be leffet beathe declination found in the cable : but if the quotient be greater the denomination must be alrered fromosth to fouth per from south to north; contrary to that the table heweth. If the quotient be atqual to the doclination found in the former sable the funne is in the very aquinodual point , and bath no detunn: being vuder the merid .lastinoiseils

more plaine: suppose therefor the 30 of Match 1599 you were sayling in the baye of Mexico differing

differing in longitude to the westwards from the meridian of London about 90 degrees by æstimation : The declination of the sunne for that day found in the former table is 7 deg:30. mi:which subtracted out of y dergz mis (the dodination auniwedable to the day following) there remaineth 22 mins which is the difference of declination in 24 howres at that cime. Nowe 15 360 is to 22 mins fo is go degre min and one half(the part proportional or equation defired) which because the declination increase the and the baye of Mexico is also westward from the meridian of London; must be added to the declination before found in the table, and fo thal you have the true declination of the funde that day, at moone for that place 7 degre 35 min. and an half. But admit you had fayled eaftwards, and were in the east Indian Ocean (es, differing like. wife in longitude from London about po des grees: therefor the difference of declination, and the part proportional therof, or aquation of the declination that be the fame they were before. But because you are gone so much eastwardes the funne commeth 6 howres foonerse your meridian there then it doth to ours heere at London: and therefor because the declination alfo is increasing and will be greater when the funne commeth to our meridian then it was the funne being vnder the meridian of the caft Indiescharaquation of declipation must there be Jubiracted one of the declination found in the cable which before was to be added when wee differing Supsupposed you to bee in the bay of Mexico, beeause the suncometh later by fix houres to the meridian of that place, then to ours, & therefor the declination of the funne increasing in the meane time, will be greater there then heere.

Now imagine you had fayled the fame your through the streights of Magellane, and having passed ouer the south sea, were the 13 of September come neare the Philippinas, differing in longitude from London westwards about 210 deg. In this example, because the funne is vicare the equinodialipoynt (altering his declination 24 min. in 24 houres, that is, tor cuerie houre one minute) therefordenide 210 (the difference of longitude)by 15 (thenumber of degrees contained monthoure) the quotient will be 14 (the difference of declination answerable to shat difference of longitude.) The declination found in thetable for that day is 4 minutes northerly: which (declination) borniers doctes lethe (the funnemot beeing yet come to the equipoblish muff be subtracted out of 24, and there shall romaine to min the declination of the funne that day at noone for that place. But this declination is foutharly because the quotient sais greater then 4, the declination found in the tables wes

It would be at this titne to attitious for mee furtherso exmephilic every particularitie specifich in the formed rules, which may cause some forall divertice in the vie sofiche brunes dechiation, having alreadic given examples of the hardest cases that may betall herein, which if they bee well-confidence, and repetally compared with the globe of sphand, it who tein the yellos manner of the summer about on and declination may most easily not onely be seene but also sole as it were with the singers ender) the reason and demonstration of all bhose sules, and of all the dimensions of working the roin specified, may most plainly appeare to him that is but of meane capacities of the same and all the same capacities and appeared to him that is but of meane capacities and all the same all the same and all the same

But because the declination of the funne is then only of good vie for kno wingshe latitude aulea when his meridian altime may be oblerand a four although all the reft of the day and night bed faire and clearer of a cloude court the funne but and describe an house, didy shout moone, wound ables of the funnes declination will flande you in heaftend is theird have beent therfore other sheakes deviled for attayning to the knowlege of the heighpof the pole not only in particular by obdernation of the pote franch ghardes, becalfo in generall by chemeridanialtitude and diclination of any notable fixed flar whatforder Sous not in the day time alone, & abaronelyar hoone; bor almost at any tyme of the night trainy totall portion of the headen towards the north or douch appeare but a finall symedemethrough the raking clouds, the latitude of the place where you are may hereby be more bally knownes shemby obletuation of che folmos met idintrabilande For the omitt the -thanging of the fannes declination from North to South, and from South to North twife in ebe

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Atable of fixed Starres about the Equinoctial.

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10 But feeling this former table conteyneth almost no other stars bur fuch as are between the tropits. and neere about the aquinoctiall citete, which are not to fitte to be obferued by them that layle faite southwards, drander the burny zone diforthere they will be room high above the horrson) I thought good heretore idioyne inother table of as manie more principal fixed flares (heedefully observed allowith the Danc quadrant) that are placed heare about the pully which may mand you draw there h Read restricted many alkent out of other wars of the training because they come twise to the total विभागकिक स्थानिक विभाग स्थानिक in winter time many of them may bee oblettlet delicate with the plant and and and participal should ght. See appearant appointment of the welliam Herbertan Ayle Hornwards, and be ben to because the construction which they entered to the incurrent properties which they shall and 19 Minused abolic the Pole. Private discarrie abre differesh from the former, that whereas The 1610 mer were fet down the declinations of the starres. ortheir distances from the equinoctiall, in this contrariwife are fette downe the complements of their declinations, or their distances from the pole, wherby the heigth of the pole may more easily be found, then bytheir declinations, onely by adding the heigth of the starre observed benearh the pole, to the distance thereof from the pole: or by subtracting onely the distance of the starre, from the pole out of the northerly meridian alritude, obserucd

ned abaya sinapole distributed in interest in ingrale hade of the desire he forwhedy whether mobile med being digind adalisated actions there are the ment beemelined of the Agreement and one of the remainder sylvantament she flament she poly sherareaddhearporsonisme ayabonolasit sony malnufed the knowing six last indeputhe Grand or Hauss having levels declination, howify Acad hereplebe somplement of dealleavid payers les de projet de cables de being bet de lucine en flactor alyesies substacted par stichis complements hould lesselyou the height of the policer less that n winter time many of them may bee obrided to be restable and research for the address of the state of the st (as before) sha namer of the frame in the heisenwolanens of declination The shirt columns give try on entition has done done browless strongered differeth from the former, that where strugger mer were fer down the declinations of the flarres. ortheir distances from the equinoctiall, in this contrarivite are lette downe the complements of deir declinations, or their distances from the pole, wherby the heigth of the role may more cassly be found, then bytheir declinations, onely by addring the beigth of the starre observed beneath the poles to the diffance thereof from the pole: or by fubtrading onely the distance of the scarre, from the pole out of the northerly mendian alritude, oblerbou

Atable of fixed Starres about the North Pole.

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Atable of fixed Starres about the North Pole.

310.	-JA :	Righ	Nowe because the fixed starres are then onely
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	Mir.	do	white that meaneth to observe them, to knowe
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5	33	to	seginping and midit of cuery among him the
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00	54	Athe	Annesbefore Recordowne : with help of which
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2	26	(VCA	Tem Off age or what sime 2 years tombrud orbit
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na na	1.0	MARI	ACCUMONS THE KROWN IN PROPERTY OF
12	05	COL	to the mendian, and that after this many
8	10	End	out out the table to levident be described and the
2	48	23	dibrothere of Cassiopeiaes chaire. 33 . 2

wherein you observe the moneth whe appear margine of the Table patients with the fartises: lumine therefre ziche lett hand the common meeting of the columne deleending from that month, and of the line proceeding from thaiday towards the right hand, Mall give you the funnes wight and cention in houses and minutes, for the fameday; This right aftention of the funne, lubtract alwaics out of the right alcention of the flarte, adding 24 houres to the flares right afcention, if to bestelle then the right accontion of the fumer the remainder he west how many houres and minutes after noone, the flar comment to the vpper part of the meridian, which if they be more theness houres, Subtractive the from them, and the tempinder stal thewe you how many houres and minutes after midnight, the flare commethe the vpper part of the meridian. The opper part of the meridian I call that, which patient from the poleby the zeaith to the horizofouth wards. But it shall be needfull also many times; when you would observe the farres about the pole (which never let) to knowe the time of their comming to the nether part of the motidians which may vesic cafily be done, only by adding twelve houres to the time of theyr comming to the vpper part of the meridiany if it beedeffe then twelte houres, or by fubracting as ther the when a comment of thom seld in the

Suppose for example, the 250 February, 1599 would know the time of the great dogs comming to the meridian: First therefor (in the next table) following the columne descending fro Februarie

downeyardes, and the line proceeding from the 25 days towards the tight hand, in the common meeting of them both. I finde as howers, to minite hunges right alcention that day at noone. Then in the first table of fixed starres. I finde the great dogges tight alcention to 6 degrees, 27 min. to which (because it is less then the sunnes right alcention) I adde 24 hours, and the summe of both commeth to 30 hours, 27 minutes. Out of this I subtract the sunnes right alcention 23 hours, 10 min and there remains 7 hours, 17 min she time of the great dogges comming to the ypper part of the meridian after noone, and the ypper part of the meridian after noone, and the ypper part of

Takeone example also of a flarre, that never femerbrand admit the 20 of December next you wouldknow what sime the foremost guarde cometh to the meridian beneath the polar First therefor you had find as before, the funs right accordion that day to be 18 houres, 36 min And the tight afcention of that flares fin the freond table of fixed starres) 14 houres, 54 min to which (beging leffe then the funnes right aftention) addic 24 houres and from the fummers houses, 54 minutes fubtract she funnes rightsaften from 18 houres, 36 min. there hal somaine an boures, is minutesithe time of the foreguards comming to the upper place of the meridian; from which subtract 12; fo have you the time when it commeth to the nethics patrios. the meridian 8 hours standil 8 maintenance

would know the time of the great dogs conuning to the meridian (First therefor (in the poxteable)

Altowing the columne descending tro 1 ebruarie

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Atable of the sunner right of cension forms

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6	19	572	21	58	13	44	1	36	36	ALC: NO.	5 30
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16	20	34	22	36	0	20	3	14	-	-	6018
17	30	38	22	40	0	23	31	18	41		6810
13	20	42	22	44	0	17	21	20	_	-	_
19	20	46	22	48	0	31	91	26	91		6034
20	20	150	32	52	Oi	35	2	30		20	6138
21	20	54	22	56	0	38	9.	33	4		6:42
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I					0	-	(, ,	.0	1		11.	1	22.1	19	2	By

By these tables of fixed starres and right ascensions of the lunne, you may eafily knowe also the houre of the night at any time of the yeare, after this manner. Looke which of those starres is at the meridian, which may eafily be knowne by a neede diall or compasse; or if you will observe the north ftars that neuer let (which indeed are fitteft for this purpose, especially when they come to the meridia vinder the pole) you shall first finde the place of the pole in the heavens, so neare as you can by aftimation (for a little error herein breakes no square) which may be done thus. From the Polestarre directly towardes the first starre next the rumpe in the great beares tayle, imagine almost so much space as the guardes are distance funder, for neare thereabouts is the place of the pole. Nowe betwixt your eye and this place of the pole, hold a plumbline, hanging as perpedicularly & steadfastly as you may, & marke withal h that plumbline come betwixt your fight, & any of the stars noted in the table of fixed starres about the polestor that starre is at the meridian. Then learne (as before was thewed) at what time that flar cometh to the meridian, and fo you shal have the houre of the night. Suppose for example the 10 of Februarye, you

Suppose for example the 10 of Februarye, you finde after this manner the swans taile at the meridian vinder the pole, desiring hereby to know the houre of the night at that time: The right ascension of the sunne for that day, you shall find as before, to be 22 houres, 14 min, whereto you may adde a minute or two more (because that starre will come to the meridian very late in the eneming) so

plag

making the sunnes right ascension 22 houres, 16 min. The right ascension of that starre in the second table of fixed starres, you shall finde to be 20 houres, 30 min. From which (because now you defire to know the time of that starres comming to the nether part of the meridian) you may subtract 12 houres, and there shall remaine 8 houres, 30 mi. To this remainder, because it is lesser then the sunnes right ascension adde 24 houres) and from the summe (32 houres, 30 min.) subtract the right ascension of the sunne 12 houres, 16 min. So there shall remaine 10 houres, 14 min. the time of the night desired.

Of finding the elevation of the Pole by obfernation of the pole starre and guarde.

Besides the wayes alreadic spoken of, to finde the elevation of the pole by the meridian altitudes and declinations of the sunne and fixed starres in generall: there hath beene also vied another way more speciall, by the height of the pole starre, whe the fore-guard is scituate from it, either towardes the east, west, north, or south, or else vpon the middle poynts betwixt these principall, as vppon the northeast, northwest, southeast, and southwest poynts. Of which way as it hath beene hitherto published and vsed, I must for the present onesie give the mariner warning that hee trust not to it, being verse erroneous, and grounded vpon twoo salse positions. The one is, that the distance of the

polestarte from the pole, is three degrees, 30 min, which has often and exact observation, is found to be at this time not about 2 deg. 32 min. The other is, that the equations or allowances (to bee added to, or subtracted from the height of the pole starte, to finde thereby the height of the pole) are made the same for all latitudes.

But having alreadie frewed sufficiently howe to knowe the latitude almost at any time of the night by the fixed starres in the former tables, I hope to bethe easelier excused for finding a fault herein, and not amending it at this time, meaning fo foone as the giver of all good shall lead me leylure, to shew a way by observation of the pole starre and guards, ofine presently the heigth of the pole, not onely when they shal be in some of tho se eight principal politions afore mentioned, as hath beene yled, but in any other polition also, and at any time of the night, when the guardes and pole-starre may be leene and that without any allowance during ortaking by addition or lubtraction of any acquation, in regard of the pole-starres, being higher or lower then the pole.

In the meane time I wish the friendly readers profiting by that is alreadie delivered, may be aunswerable to my paines herein, and good will towards him, which is he shall finde, let him thankfully remember with me, the Right Honourable the Earle of Cumberland, by whom I was first moued, and received maintenance to divert my mathematicall studies, from a theorical speculation in the Vniversitie, to the practical demon-

stration-

perience at lea, and that especially in his property of age to the Azores, happily performed in the yeare 1589. The whole discourse of which voyage, beeing the first occasion to mee of writing the former treatile. I thought good also have as an appendix to adioyne here.

But have of aireadiscones in any cone of the night by the fixed for each trivial alternation and cone of the night by the fixed for each to be the adopt a suice of the night be the each in a suice of the cone of the not around a grant to alternation of the cole flarre dad guards.

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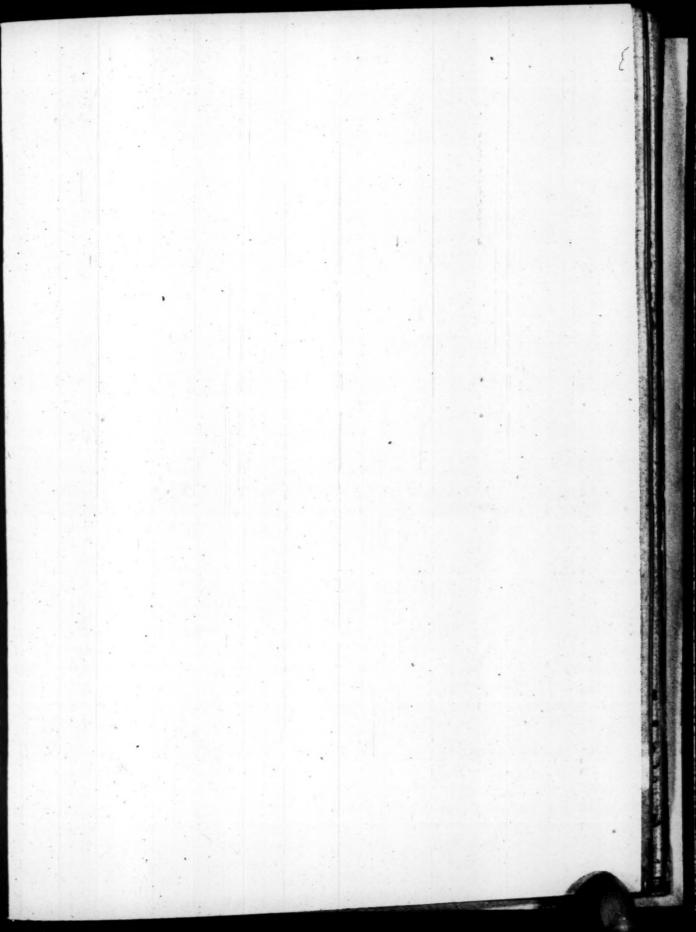
a way by obternation of the cole flarre dad guards.

but on they find he in tenie of the feetight principal polition is afore mentioned, as hath occur vied, but in any other polition also, and at any time of the night, when the guardes and pole flarre may the night, when the guardes and pole flare may

In the meane time I will the friendly readers profung by that is alreadic deligered, may be annot exclude to have a local end to each to have be annoted to have the final time of the handle of the final time of the maintenance to done may noted, and cooling the maintenance to done my nicthematical free may not be written to the practical free what the maintenance to done my nicthematical free what the maintenance is done and the could be and the control of the major that the world of the practical free what the maintenance is done that

lower their the pole.

frauon.





The Voyage of the right ! GEORGE EARLE OF CYMBERL

snorther any post to the of zores, de.

HE Right Ho. the Earle of Combintend having schisown charges prepared his final Fleete of foure Town Sayle onely, viz. The Villerie, one of the Queenes Ships royall, the Megg, and Margaret, small Ships, (one of which also he was forced soone after to send home againe, finding her notable to endure the fea) and a final Caruelliandhauing aftembled together about foure hundred men. (or fewer) of Gendemen, Souldiers, and Saylers, embarqued himfelle and them, and fet layle from the found of Plummonth in Denon-Bur, the eighteenth day of lune, 1,89, being accompanied with thele Captaynes and Gentlemen which heereafter follow.

Coplaine curpose Life, aman othereat diligence, courage, and refoliation, Captaine Edwarde Careleffe, alias, Wright, who in S. Francis Drakes Well-Indian voiage was Captaine of the Hope.
Captaine Beforell, Captaine Merinin, M. Henry Longe, M. Partridge, Mainer North Mainer William Mounton Captaine of the Mogge now 3.00 alian Managen, Maister Pigeon Captaine of the Caruell.

About three dayes after our departure from Plimmouth, we mer with three French mippes, whereof one was of Newbases, and office of S. Males, and fo finding them to be Leaguers and lawful Prize we tooke them and lent two of them for England with all their foding which was fifth for the most parte from New found. Last laying that there was parte theref distributed amongst our final Piece, as we could finde frowage for the fame, and in the

third all their men were sent home into Fraunce.
The same day and the day following, we met with some other when twhen after fome denterence had with them, we wanted to be after whatever and Empley both de for Range and Empley both de for Range and Empley and Em

The 18, and 29, dayes, womer diners of our English shipper, returning from the Portugall Voyage. The thirteenth day of July, being Sonday in the morning, we especial eleven thips, without light of the Coast of Spaine, in the height of 39. degrees, whom we presently prepared for, and provided to meete them, having first for fourth the Mer before vs to deferie whence they were. The Megge approching neere, there passed some shot betwise them, whereby, as also by their Admirall, and Vice-admirall putting foorth their Flagges, wee perceived that some fight was likelye to follow. Having therefore fitted our felues for them, we made what halt we could towards them with regard alwayes to get the winde of them, & about 10, or 11. of the clocke, we came up to the with the Victory. But after forme few thor, and some listle fight palfed betwixt vs, they yeelded themselves, withe Maisters of the all cameaboordevs, thewing their fourtall Palportes from the citties of Hambourg & Lubecke from Breeme, Pemerania, and Calica.

They had in them certaine bagges of Pepper and Sinamome, which they confessed to be the goodes of a levve in Lifters, which should have been carried by their owne confession to be lawfull or there, and so finding it by their owne confession to be lawfull Prize, the same was soone after taken and denided amongst our whole companie, the villeve where twas esteemed to be about

4 500, poundes at two shillings the pound.

The 17. day, the foresaid ships were dismissed, but 7. of their men, that were willing to goe-along with vs for Saylours, were tooke to helpe vs, and so held on our course for the Acres.

Two dayes after some of their Saylours remaining with vs. reported that the saide Easterlinges shippes, had also in them wyout tie thousand poundes woorth of Spanyards goodes: but then it was too sate to search them.

The first of August beeing Fryday in the morning, vechad sight of the lland of S. Michaell, beeing one of the Eastermost of the Azeres, toward which we sayled all that day, and at night he uing put soorth a Spanish Flagge in our maine toppe, that is they

might the leffe furpest varyapproched neere to the chiefotowine, and reade of that Iland, where we espied three thips inding at anchor and some other small Vessells : all which we determined to take in the darke of the night, &c accordingly attempted about to. or element of the clocke, fouding our boates well manued to cutte their cables, and hanfers and let them drive into the lea. Our men comming to them found that one of those greatest ships, was the Fiates of London becing there ynder a Scottish Pilot, who bare the name of her as his owne. But three other smaller ships, tharlay notre voder the Caffle there, our men lectonie, and rowed them away voto vs. most of the Spaniardes abartwere in them, leaping onesboard, and fwimming to thoare, with lowde and lamentable out cries, which they of the towns heating, were in an uprose, and answered with the like crying. The Castle disharged some great thor at our boates, but thooting without marke, by realen of the darkenes, thei did vs no hure. The Scots like wife dicharged three great geoccis into the Ayre, to make the Spaniards thinkether were their friendes, and our enimies, and thorthy after the Scottifb Matffer and lome others with him, came about dromy L. doing their ductie, and offering their lemice, &c .: These three shippes were

fraughtswith wine and Sallet oyle, from Sentl.

The lame day our Caruellehated a Spanish Caruell to shoare, at S. Michaells, which carryed letters thither, by which we learned, that the Carrickes were departed from Terens eight dayes before.

The fevents of August we had light of a little shep, which wee chased towards Lerene, with our Pinnesse (the weather being calme) and towards eneming, we outmooke her, there was so her to. Tunnes of good Madera W ine, certains wollen cloath, silke, Tassar, &c. The 14, of August we came to the Iland of Placer wher we determined to take in some tresh water, & sresh victualls, such as the Iland did assords. So we maned our boats with some two men, & rowed towards the shoare. Whertoo when we approached, the Inhabitants that were allembled at the landing place, put footthe stag of truce; wherupon we also did the like.

ומוייניי

When we came to them, my eased game them to wherethend by his Portugall Inter preter, that he was a friend to their King Day Automio, and came not any invay to milite them, but that he ment onetwo have some fresh water, and fresh with that he is them; by way of exchange for some promision that he had, as Oyle, Wine, or pepper, to which they presently agreed willingly, and sent some of their companies or Beefes and sheepe, and we in the meane sea-son marched South ward about a myle, to Villa Salita Town, from whence all the Inhabitants young and ould were departed, and not any thing of vallence left. We be demanding of them, what was the cause hecreofythey answered, search as them vittall manner was swhen any ships came need their coast.

barren hilles and mountaines, little inhabited, by reason that it is mollested with suppers of warre: which might partly appeare by this towns of Santie Criss (being one of their chiefe townes) which was all rumous; and (as it were) but the reliques of the ancient Towns, which had been burnt about two yeares before, by cereayne English ships of warre, as the Inhabitants there reported,

At escaing as we were in rowing rowards the Victoria, and huge fish pursued vs for the space well night of two myles together, distant for the most part from the boats steme not a speares length, and sometimes so neare, that the boats steme not a speares length, and sometimes shoute the ghilles (appearing of times about the water) were by estimation fourt or five yardes a lunder, and his lawes gaping ayarde and an halfe wide, which put vs to searce of one training the Pinnelle, but God be tracked (rowing as hard as we could) we eleaped.

When were about Flares, a little hip called the Parks, brought vs word diarthe Carlete were at Terang of which news we were very glad, and fped vs thicherward with all the speede we could; and by the way we came to Farel road, the leuen and two tetheday of August, after tunne fet, where we cloyed certains ships ryding at anker, to whom we leut the Sarfae Lacks, a finall shippe,

lately conforted with vs., and our skiffe well manned, with which ships out menhad fight about an houre in the night, the towneal to descharging their great ordinance from the Platforme there, in defence of those shippes, where with the Maisser onely of our Carnell was horr; but in the end out men brought them all out of the harbour, beeing six in minber, whereof one was of a for. Tunines, lade with Sugar, Guiger, Hides, Sec., fately come from the Wast. India.

Two of the worst we let floate on the Sea, having first taken bland them such thinges as we liked. The other source were sent for England, the 30, day of August.

At the taking of these prizes, were consorted with vs some of ther small men of warre, as Maister Iohn Danis, with his ship, Pinnesse, & Boate, Captaine Mark shorte, with his ship, whose owner was S. Watter Raleigh, the Barke of Lime, which was also consor-

red with vs before.

The last of August in the morning we came in Light of Legems, beeing about some 9. or 10. leagues from shoate, where we
espied comming towards vs, a small boate vader saile. which see
med somewhat strange vato vs, beeing so farre from land, and pp
ship in light, to which they mought belong: But comming access
they put vs out of doubt, showing they were English men. (analyin number) that had lately been prisoners in Toward, and finding
sopportunitie to escape at that time, with that small boats, commisted the selies to the sea, under Gods promidence, having no other
yard for their maine sayle, but swo pipe states tyed sogether by
the ends, and no more promison of victualles, the they could being
in their pockets and bosomes. Flatting taken them all into the Viesand, they game vs certaine intelligence, that the Garriels were departed from the needbout a weeke before.

Thus beeing without any further hope of those Concles, was relocated to return for Equal, with intent to suffering the Towner Bur southly paid September over had either the winds for notice rie, or the weather so calting that in all that title, we had distinct a locate of the concession of the leagues way, lingting up and downe not far from Pice.

13

The

Therenth of September, beeing Wednelday in the alternoone, wenceme agains to Fajell roade. Whereupon immediately my Lifer Captaine Lifer, with one of Granissa (whome C. Mannion had before taken) and some others, powards Espall, whom certaine of the Inhabitants met in a boate, and come with Captaine Lifer to my Lato whom he gaue this choyee: eighter to suffer him quietly so enter into the platforme there without refultance, where hee and his companie would remaine a space without offering any jointie to them, that they (the Inhabitants) might come vinto him and compound for the Ransome of the Towne; or else to stand to the hazard of warres.

With these wordesthey returned to the towne: But the Reepers of the platforme aunifwered, that it was against their oath, and allegeance to King Phillip, to give over withour fight, Whereupon my L: commanded the boates of cuerie thip, to be preferrly manned, and loone after landed his men on the landye moate, ynder the lide of an hill, about halfe a league to the North-Wardes from the platforme: vpon the toppe of which hill certaine Horfemen and Footemen flewed themselves, & other two companies also appeared, with Ancients diplayed, the one before the towne, upon the Boare by the fea fide, which marched towardes. our landing place; as though they would encounter vs; theother in a valley to the southwards of the platforme, as if they would hane come to helpe the Townelmen during which time, they in the planforme also played upon vs with great Ordinance, Not-Widthiding my Lo (having fer his men in order) matched alongst delcahome, whom the landes, between the les and the Towns, covardes the platforme, for the space of a myle or more, and then the shoare growing rockie, and permitting no further progresse; without much difficultie, her entred into the towne and palsed through the fittee: without reliffance, ware the platforme, torshold Companies belose meneyoned, at my Lot approching, water consultiperfed, and folderly vanished,

adT

Likewise they of the platforme? (beeing all fled at my Lordes comming thither) left him, and his Companye to scale the Walles, to cotter and take possession without resistance.

In the meanetime our shippes cealed not to batter the foresaid. Towns and Platforms with great shotte, till such time as weed laws the Red-Crosse of England florishing upon the Forestone shereof.

This Fayall is the principall Towne in all that Land, and is a scituate directly ouer against the high & mightie mountaine Piece.

lying towardes the West North-west from that mountaine, because ing devided therefrom by a narrow Sea, which at that place is by the estimation about some two or three leagues in breach, between the Ilandes of Fayall and Pice.

The Towne conteyned some three hundred Housholdes their houses were faire, and strongly buylded of Lime and Stone and & double coursed with hollow tyles, much like our Roose tyles. The but that they are lesseat the one end then at the other, in manner of of a Concaue semiconical figure.

The first course lyeth with the hollow fides, and greater endes vpward, the lesser end of one tyle, lying alwayes within the greater end of the other; in such some, as (all alongs the house, from the Roose to the Bues) they make so many gutters, as in there are courses of Tyles layed.

The second courses are layed with the round sides, and less seconds ypwardes, coursing under their hollownes, the edges and of the former courses, insuch sorte, that all the raines that falleth of strom the backes of the Tyles that are layed in the second courses, and runneth downe the foresayde gutters without tains or insection of Morter, or myre, and so becing received into Cisternes, supplyeth very well their necessarie with the place of the manner ter: Whereof otherwise there is great want in that place of the

Buccie house almost had for this purpose process Terme of Well in a Garden, on the Backeside; In which gardens I

grewe Vines (with ripeclusters of Grapes) making pleasant shall downes: Tabacco now commonly knowne and yeed in England, wherewith their women ther, dye their faces reddish, to make the seeme fresh and youngs Pepper, Indian, and Common: Figg-tree, bearing both white and red Figges: Peach-trees, not growing verterall: Orenges, Limons, Quinces, Parase rootes, &c. Sweet wood, (Cæder I thinke) is there very common, euen for building

and fiering

My Lo: having possessed himselfe of the towne and platforme, and becing carefull of the prescruation of the Towne, gave commandement, that no Marriner or Souldrout, thould enter into any houle, to make any spoyle thereof. But especially her was carefull that the Churches and houses of Religion there, should be kept inviolate which was accordingly performed through his appoyntment of Guarders and Keepers fortboleplaces : But the reft of the Towns, eyeher for want of knowledge of the former Inhibition, or for defire of spoyle and pray, was sifled; and ranfacked by the Souldiers and Marriners, who scarcely left any house unsearched, our new hich they tooke not tuch things as liked them, as Chefts of Sweete wood, Chaires, Cloath, Coverlers , Hangings, Bedding, Apparelly And in ther ranged into the Country, where forme of then also were harr by the frambitanes. The Fryeric there; conteyning and maintaining 30. Franciscour Fryers (amongs whome weecould not linde any one able to fpeake true Latine) was builded by a Firser of American Timera, of the fame order, about the yeare of our Lord, 1, 06. The Tables in the Hall had feates for the one fide onely, and were alwayes couered, as ready at all times for dinner or fupper- 12 shy lanch or

From Wednelday in the afternoone, at which time, we entred the Towns, with Saterday night we continued there, virtill the Inhabitants had agreed, and payed for the Ranforme of the Towns, and Ducats, most parte where was Church-Platoine of the Platoine had been a likely to sure.

Westonndin the Castle eyght and fiftie yron peeces of Or-

denence, wherefehred and twentic (as I remember) or more were ready mounted ypontheir cariages, betweene Barriadors vpon a platforme towards the lea fide, all which Ordenauncel we tooke, and fer the Platforme on fire, and so departed: My Lordhauing inunted to dinner in the Victory on the Sonday following, fo many of the Inhabitants as would willingly come (fauc onely Diego Gowes the Gouetnour, who came but once onely to parlee about the Ransome) onelye foure came and were well enterrained, and solempely dismissed with found of Drumme and Trumpets, and a peale of Ordenances to whom my L: delivered his letter subscribed with his owne hand, importing a request to al other Englishme to abstaine from any further mollesting the, saue onely for fresh water, and yiehualls necessarie for their intended voyage. During our aboade heere (wiz. u. Septembris) two men came out of Pare which had beene prisoners there: Also at Fayall we fet at liberties prisoner translated from S. lago, who was Cosen to a servant of Don Matanio K. of Porrugall in England: Thefe priloners wee dereyued with vs.

On Monday wee sent our boates a shoare for stesh water, which so reason of the raine that sell the former night) came plentifully running downe the hills, and would otherwise have beene hard to be gotten there. On Tuesday, likewise having not yet sufficiently served our turnes, wee sent againe for fresh water, which was then nor so easie to be gotten as the day before, by reason of a great winde: which in the afternoone increased also in such sort, that we thought a not safe to ride so neere the land; whereuppon wee weyed anker and so departed north-west & by-west, alongst the coast of Fayall sland. Some of the Inhabitants comming abourd to ye this day, tould ye that alwayes about that time of the yeare

fuch windes West South-west blew on that coast.

This day as we layled neere S. Georges Iland, a huge fish lying still a little under water, or rather cuentherewith, appeared hard by a head vs, the sea breaking upon his backe, which was blacke coloured, in such fort, as deeming at the first it had beene a rocke,

B

and the shippe stemming directly with him, we were put in a sod! daine seare for the time: till soone after wee lawe him moue out of

the way.

Septemb. 16. in the night it lightened much, whereupon there followed great windes and rayne, which continued Sep. 17 18. 19. 20. 21. The 23. of September wee came against into Fayall roade to weigh an anker which (for bafte referre of soule weather) wee had left there before: wherewee went a shoare to see the towne, the people (as wee thought) having now settled them-felues there againe: But notwithstanding many of them, through too much distrustfulnes, departed and prepared to depart with their packets at the first sight of vs. yntill such time as they were assured by my Loe that our comming was not any way to insure the. but especially to have stell water, and some other thinges needefull for vs. contenting them for the same.

So then wee viewed the Towne quietly, and bought such thinges as wee delired for our mony, as if we had been in England.

And they helped to fill vs in fresh water, receiving for their paines

fuch faulfaction as contented them.

The 25, day wee were forced against o depart from thence, before wee had sufficiently watered, by reason of a great tempest that soddenly arose in the night, in so much, that my Lot himselfe soone after midnight raysed our men out of their Cabines to weye anker, himselfe also together with them haling at the Capsten, and after chearing them up with wine.

The next day weelent our Caruelland the Saufie Iacke to the roade of S. Michaels, to see what they could elpye: We to lowing after them vpon the 27. day plying to and fro, came within fight of S. Michaels, but by contrarie windes the 28. 29, and 30. dayes were were driven to leewards, and could not get necre the

Hand.

The 31. day we fayled alongst Tereses, and even against Brais.
(a promontorie neere to Angra the strongest Towne in that llad)
were espied some boates comming to the Towne, and made out
towards.

towardes them : but beeing neere to land they range to floare &

ecaped vs.

In the afternoone wee came neere to Gratiss, whereuppon my Lo: foorthwith sent Captaine Lister to the Ilanders, to let them understand, that his desire was onely to have water and Wine of them, and some fresh victualls, and not any sutther to trouble them. They aunswered they could give no resolute answer to this demaund, until the Governours of the Iland had consulted theruppon, & therefore desired him to send agains to the the next days.

Vppon the 1. of October early in the morning, wee lent foorth our long boate and Pinnesse, with emptie Caske, and about some 50. or 60. men together with the Margaret, and Captaine Danis his thippe: For wee now wanted all the rest of our consorts. But when our men would have landed, the Handers shot at them, and would not suffer them. And Troupes of men appeared vpo land. with ancient displayed to resist vs: So our boates rowed alongst the thouse to finde some place where they might land, nor with too much difaduantage : our fluppes and they still shooting at the Iladers. But no place could be found where they might land without great perul of looling many of their lives, and fo were confirmed to terire withour receiving any answere, as was promised the day before We had shree men burt in this conflict, while our boats were together in confulting what was best to be done: two of the were ftrooken with a greate for (which the Handers drewe from place so place with Oxon) wher with the one loft his hand, & tho other his life within 2. or 3. dayes after: the third was foot into his necke with almal that, without any great hurt. With thele newes our companie returned backe againe at night, wheruppon preparation was made to goe to the against the next day: But the day was far from before we could come neere them with our thip: Neuher. could we finde any good grownde to anchor in, where we might lye to batter the Towne, and further wee could finde no landing place without great danger to look many me; which moght turne toconhisosbaquarthrow of our voisge, but also put the Q. Thip in great po-· bauad

perilt for want of men to bring her home Therefore my Lorn thought it best to write to them to this effect : That he could not a little maruell at their inhumanity, and crueltie which they had thewed towardes his men, feeting they were feet by him vinto them in peaceable manner to receive their answere which they had promiled to give the day before: and that were it not for Don Antonio. their lawfull King his fake, hee could not put vp fo great injury at their handes, without just reuengement ypon them: Norwithstanding for Don Antonio his fake, whose friendhe was, hee was! yet content to lend to them once againe for their answere: At night Captaine Lifter returned with this answere from them. That their Gunner shot of one of their preces, which was charged with powder onely, and was stopped; which our men, thinking it had beene for at them, shor againe, and so began the fight : and that the next morning they would fend my Los a telolite aunswere to his demaunde, for as yer they could not know their Gouernours minder heerein. The next morning there came voto vs a boate from the Moare with a Flag of truce, wherin were three of the chiefe men of the Iland, who agreed with my Lo: that hee should have of the 60. Buttes of wine, and fresh victualls to refresh himselfe and his companie withall. But as for fresh water, they could not fatillie our need therein, having themselves little or none, saving such as they faued in vessells or Cisternes when it rayned, and that they had rather give vs two Tunnes of wine, then one of water: But they requested that our Souldiers might not come on shoare, for they themselves would bring all they had promised to the waterfide, which request was graunted, we keeping one of them abourd with vs, vntill their promise was performed, and the other we sent to Moare with our emptie Calke, and fome of our men to helpeto! fill, and bring them away with fuch other promision as was promisi led : So the Margaret, Captaine Danishis thip, and another of may womb flayed ryding at anker before the Towner to cake in our prowision. This shippe of waymouth carrie to vs the day before, ac had Aken's rich Prize (asit was reported) woorth forestechouland pounda

pound, which brough inewes that the West-Indian Fleete was not yet come, but would come verie shortly But wee with the Viller, put of to sea: And ypon Saturday the fourth of October, wee tooke a French thip of S. Maloes (a Citye of the vnholy league) loden with fish from New-found land; which had beene in to great a tempest, that shee was constrayned to cut her maine mast, ouerboord for her lafetie, and was now comming to Graciofa, to tepaire her felte. But fo hardly it befell her, that the did not onely not repaire her former losses, but lost al that remained vinto vs. The chiefe of her men wee tooke into our hippe; and lent lome of our men Mariners, and Souldiers into her to bring her into England.

Vppon the Sonday following at night, all our promifed pronifion was brought vino vs from Graciofa: And we friendly dif-

willed the Handers with a state of Ordenance.

Vpon Monday, Tuelday and VV educiday, wee plyed to and from bout those Handes, beeing verie rough weather. And vpon Thursday at night, beeing drive some three of sourcleagues from Teroera, weelawe 15. layle of the West-Indian Fleete comming into the Hauen at Augrain Tercera. But the winde was fuch that for the space of source dayes after, though wee lay as close by the winde as was possible, yet wee could not come heere them, In this time we loft our late French prize, not beeing able to lye foneere the winde, as wee, and heard no more of her, till wee came to England, where thee lafely arrived. Vpon Monday wee came very necre the Hauen mouth, beeing minded to have runne in amongst them, and to have fetched out some of them, if it had been possible: But in the end this enterprize was deemed too daungerous confidering the strength of the place where they rode, beeing haled and towed in negret the towne, at the first light of our approching and lying under the protection of the Caftle of Brafill, on the one fide (having in it fine and twentie pecces of Ordenance) and For on the other fide, wherein were 13, or 14, great Braffe perces Befides, when wee came neete land, the winde proued top cane for we to attempt any fuch enterpeile. 2 .goibesime FOM

Vpon Tuelday (4. Octob.) we fent our boate to the roade so found the depth to fee if there were any anchoring place for vs. where weemight lye without shot of the Castle and Fort, & within flot of fome of those shippes, that wee might either make them come out to vs. or finke them where they lay. Our boate returned having found out luch a place as wee defired, but the winde would not luffer vs to come neere it, and againe if we could have anchored there, it was thought likely that they would rather runthemsclues a grownd to faue their hoes and liberties, and some of their goodes, then come foorth to loofetheit liberties and goodes to vs their enemies. So wee fhor at them to fee if wee could reach them, but it fell large thort. And thus weedeparted, thinking it not probable , that they would come foorth to long as wee watched for them before the hanen mouth, or with the fire of them For the space of s. dares after wee put ofto fea, & lay without fight of the, & let a Princile to tye out of fight, clote by the thore to being ve word if they thould come foorth. After a while the Prinefle returned, and tould ve that those ships in the trauen, had taken downe their fayles, and let downe their toppe maltes : To that wee suppofed they would never come forth till they perceived visto be quite gone.

Wherefore vponthe 20. of October, hearing that there were certaine Scottish shippes at S. Michaels, wee savied thither, and found there one scottish roader, and two or three more at Valla France, the next road, a league or two from the towns of S. Michaels, to the Eastwardes: of whome wee had for our reliefe some small quantitie of Wine (viz. some sue or six buttes of them all) and some fresh water, but nothing sufficient to serve our turne.

Vppon Tuelday the one and twenter of October, wee fent out long boate to those for treff water at a brooke white to the Westwardes from Villa France.

But the Inhabitants copying vs, came downe with two Ancients displayed, and about tome hundred and fiftie friends med to with fland our landing. So our men haufing special their powers we

ponthem inattempting to land and not beging able to premaile ?

fo great oddes, returned frustrate in the find of the stand minding to water there, and then 19 goc for the coaste of Spaine. For wee had intelligence that it was a place of no great force, and that wee might water there very well. Therefore vpon Fryday following my Lord fent Captaine Lifter, and Captaine of miss Pref. now her Amuse Prefen (who not long before came to vs out of his owne shippe, and shee looking vs in the night, hee was forced to tari y fall with vs) with our long boate and Pionesse, and some fixing or fournie flot in them, both with a triendly letter to the Ilanders, that they would graunt vs leauc to water, and wee would no further troublethem.

So wee departed from the Vistors for the Hand about hine 2 clocke in the forenoone, and rowed treffly vitall about 3. a clocke atternoone. At which time our men beeing tomething wearye with rowing, and beeing within a league or two of the shoare, and 4. or 5. leagues from the Vettory, they elpyed Ito, their refreshing twofhippes tyding at Ankor hard vaderthe Towns whereupon having thisted some 6. or 7. of our men into Capraine Denis bis boate, beeing too much pestered in our owne, and retayning with vs some twentie shot in the Pinnesse, weemade way towardes: them withall the speede wee could.

By the way as we rowed we lawe boates palling betwixt the zoaders and the shoare, and men in their shirtes swimming & wading to shoare (who as wee perceined afterwardes) were labouring to let those shippes fast on grownd a and the Inhabitants as. butiely preparing themselves for the defence of those roaders, their Hand, and themselnes. When were came peete them, Cap. Lifter commanded the Trum-pets to bee founded, but prohibited eny shorto be discharged at them, vitill they had direction from him: But tome of the company, either not well perceiving, or regarding what hee fayd, immediately yppon the founde of the Trumpettes discharged their Peeces at the llanders, which

which for the most parterlay interchica, and forces of places on Seene to their owne best, aduantage: Who immediately shorlike. wilearys, both with Imaliand great Hot; without danger to the Sclues: Norwith flading Captaine Lip derneftly haftened forward the Saylers that rowed, who began to the het the thot, flying fo fall about their cares, and himselfe first entring one of the thippes that lay a little further from hoare, then the other, wee speedely tollowed after him into her, fill plying them with our shotte. And hairing cut in funder their Cables, and Haucers, towed her away with our Pintieffe. Tirthe meane time Captayne Dans his boate ouertookers, and entred into the other hippe, which also (as the former) was forfaken by all her men: But they were confirained to leave her & to come againe into their boate whilf thor & ftones from thoare flewe fall among them) finding her to flicke to falle agrowade, that they could not firre her : which the Townelmen also perceiuling, and seeing that they were but sewe in number & ws (bufied about the other Thip) not comming to ayde them, were preparing to have come and taken them. But they returned vato vs, and fo together weetame awaytowards the Villen, towing after vsthe prize we had now taken, which was larely come from Bratile, touch with Sugar.

In this fight we had two men flaine, and 16. wounded: And as for them, it is like they had little hurt, lying for the most parte behinde flore walles, which were builded one about another hard by the lea fille, vpontile end of the hill whereuppon the Towne stoods, between two valleyes. V pon the toppe of the hill lay their great Ordenance (litch as they had) wherewith they shotte leaden buffets, whereof one peateed through our Prizes side, and lay still

in the thippe without doing any more harme.

The next day we went agains for water to the same Iland, but not knowing before the inconnenience and diladuantage of the place where wee attempted to land, we returned frustrate.

The fame night Odob. 23: weedeparted for S. Georges Handfor fresh water, whither we came on Monday following Odob: 27:

and having cipyed where a spout of water came running downer the pinnesse and long boate were presently manned, & sent under the conduct of Captaine Present, and Captaine Mounson, by whom my Lo: lent a letter to the llanders as before, to graunt vs leave to water onely, and were would no further trouble the, notwithstanding our men comming on shoare, sound some of the poore slanders which for scare of vs hid themselves amongst the rockes.

And on Wednelday following our poates returned with fresh water, whereof they brought onely 6. Tunnes for the View, alledging they could get no more, thinking (as it was supposed) that my Lo: having no more provision of water and wine, but onely 11. Tunnes, would not goe for the coast of Spaine, but straight for the coast of England, as many of our men greatly defired; not withstanding my Lo: was viewilling so to do and was minded the next day to have taken in more water; but through toughnes of the leat and winde, and viewillingnes of his men it was not done. Yet my Lo: purposed nor to returne with so much provision viewillong in the leat and his royage (as hee thought) not yet performed in such fort as mought give some teasonable contentment or landature to himself and others.

Therefore because no more watercould now connecticative beegotten, and beeing vacertaine when it could be gotten, and the time of our staying abroad also wicestaine, the matter beeing referred to the choyce of the whole companie, whither they would earlie longer, till we might be more sufficiently prouded of fresh water, or goe by the coast of Spaine for England, with halfe so much allowance of drinke as before, they willingly agreed, that cuery mease should be allowed at one mease but halfe so much drinke as they were accustomed reaccept them that were sicke or wounded) and so to goe for England, taking the coast of spaine in our way, to see it weecould that way make upour voyage.

Vpon Saturday Octob, 31. wee lent the Magaret because the leaked much) directly for England; together with the Prize of Bradle, which wee loke at S, Maries, and in them lome of our mer at

wounded men or otherwise ficke were fent home, as they defired,

for Eugland.

witte for

But we held on our course for the coaft of Spaine, with a faire winde and a large which before we leldome had) And voo Tuels dry following (Novemb. 4, wee elpied a fayle right before vs. which wee chaled till about three a clocke in the alternoone, at which time, we out raking her, thee ftrooke fayle, and beeing demanded who was her Owner, and from whence thee was . they answered a Portugall, and from Farnanbucke in Brafile. She was a Thip of fome 1 to. Tunnes burden fraughted with 4 to. cheftes of Sugar, and so, Kintalles of Brafill-wood, euerie Kintall conteyping 100, pound weight: wee tooke her in Lat. 20, degrabout 200. leagues fi o Liftone westwardes, Captaine Presses was presently fent vato her, who brought the principallest of her men abourd the Villery, and certaine of our men Marriners and Souldiers were fent abourd her. The Portugalls of this prize tould ve that they twe another shippe before them that day about noone sall auing therefore dispatched all things about the prize afore aid, and left our long boate with Captaine Davis, taking his leffer boate with: Vs, wee made way after this other thip withall the layles wee could beare, boulding on our course due East, and guing-order to Capraine Danishis fhippe, and the prize that they bould follow vs die East and that if they had light of vs the morning following;

The next morning were closed not the layle which were chaled, and Captaine Daws his ship be the Prize vvere behinde vs out of fight. But the next Thursday Novemb, 6. (beeing in Latitude, 38, degrees 30, and about some 60, leagues from Lisbone well warded early in the morning Captaine Profess described a layle some two on three leagues a head vs, after which were presently hastened out this, and outstook her about 8, or 9, of the clocke before no one. She came lately from S. Miebiels roade, having beene before at Brasil loden with Sugar and Brasil. Having sent our boate to them so bring some of the chiefe of their men about the Vierry in the

meane time whileft they were in coming to vs, one out of the mayne top espied another sayle a head fome three or foure leagues from vs. So immediately vpon the returne of our boate, having sent her backe againe with some of our menaboord the prize we pursued speedulye this nev v chase, with all the fayles were could packeon, & abouttyvoa elocke afternoone ouertooke her? Shee had made promision to fight with vs, having hanged the fides of the Thip forthicke with hides (wherewith especially the was loden) that Mulket hor could not have pearced them: but care wee had discharged two great peaces of our Ordanance at her, thee ftrooke Layle, and approching neerer, we asking whence they were, they answered from the West Indies, from Mexico, and S. John de Lewe (truely called Vibre) This shippe was of some three or foure hundred Tunnes, and had in her feuen hundred hides, woord io Mallings a peece lix Cheftes of Cutchinell enery Cheft houlding one hundred pound weight, and every pound woorth fix and wentie hillings 8 pence, and certaine Cheftes of Sugar & China diffes, with lome place and filuer.

The Captaine of her was an Italian, and by his behaviour feeined to bee a grave, wife, and civile man; he had put in adventure
in this flip flue and twentie thouland. Ducats. We excooke him
with certaine other of her chiefest men (which were Spaniardes)
into the Vierro. And Captaine Lifter with so many other of the
chiefest of our Mariners, Souldiers, & Saysours, as were thought
sufficient, to the number of twentie or there abouts, were sont
into her. In the meanenime (wee staying) our other Prizes which
sollowed after came up to vs. And now weehad out hands fol
and with joy shaped our course for England, for som was thought
meetest, having now so many Portugalls, Spaniards, & Frenchine
amogst vs, that if we should have take any more prizes afterwards,
we had not been well able to have maned them without endangeting our selves. So about six of the clocke in the afternoone
(when our other Prize had our taken with well-best some
when one other Prize had our taken beate vs companie without
for England. But one prizes hor beeling able to beate vs companie without
for length of the many of our sayles which caused our ship to rowle &c.

wallows.

wallow in such fort that it was not onely very troublesome to value, as it was shought, would also have put the maine mass in danger of alling overboord; having acquainted them with these inconveniences, weegave them direction to keepe their courses to gither following vs. and so to come to I ort/month. Wee tooke this fast Prize in the Latitude of 39 degrees, of about 46, leagues to the Westwardes from the rocke.

She was one of those lix eene shippes which we sawe going into the Hauen at Angra in Tarerra. Odto 8 Some of the men that we tooke out of her tould as that whilest were were plying up and downe before that hauer, as before was shewer, expecting the comming footh of those shippes: Thre of the greatest and best of them, at the appointment of the Courrient of Tarerra were will loden of their treature & marchandise And in enerviols hem were put three hundred Souldiers, which were appointed to have come to lay the Victory aboorde in the night, and take her. But when this should have been done the Victory was gone out of

their fight.

Now were went metrely before the winder with all the fayles were could beare, in so much that in the space of 24. hours, were sayled neere seven and sorue leagues, that is seven core English myles, betwirt Fryday at noone & Saturday at noone (notwithstanding the shippe was veries soule, and much growne with long being at sea) which caused some of our companie to make accompanies they would see what running at tilt there should bee at Whitehall when the Qu. day, Others were imagining what a Christmasthey would keepe in England with their shares of the Prizes were had taken. But so is befell, that weekept a could Christmas with the Bishop and his claikes (stockes that yet o the West wards from Sells, and the westerne patters of England) For soone after the winds scaring, came about to the Eastwardes (the worst parter of the heatens for vs, from which the winds could blow) in such sort, that were could not seach any part of England. And sheer support also six allowance of drinke which was scant mough before, was very

See the manay of our layles which cauled our faip to con lese

more scantened, because of the searcitie thereof in the ship. Sothat now a man wis allowed but halte a putte at a meale, and that many times cold water, and scarce sweete. Notwithstanding this was an happir effatein comparison of that which toflowed. For from halfes pine wee come to a quarter, & that lafted not long beither, to that by reason of this great learcitic oldrinke, and contrarietie of winde, wee thought to put into Ireland, there to reliefe out wants. But when wee come neere thither, ying at Hull all night (tartying whereby we might off the next morning, whereby we might the late lyer bring our thippe into lome concentent Harbour there) wee were driven le faire rolcewardes, that wee could fetch no part of Ireland, to as with heavie hearts and fad cheare, wee were con-Areined to returne backe againe , and expectful it hould please God to fend vs allaire winde either for England or Ireland. Inthe meane time wee were allowed every man three or foure spoones full of Vineger to drinke at a meale, for other drinke we had none fauing onely artwo of three meales, when wee had in fleede heerof. as much wine, which was wringed our of the Wine-lees that remained With this hard fare flor by realon of our great warm of drinke, wee durft care but very little) wee continued for the fores of a four inight or thereaboutes Saving that now and then we fea-Red for it in the meane time: And that was when there fell any hayle or raine: The Haile-stones wee garhered up & did enethe more plealanty then it they had beene the Iwestell Comfits in the world. The Raine-drops were to carefully laued, that foreste as we could, not one was loft in all our flippe. Some hanged vo fheetes tyed with cordes by the foure corners, and a weight in the midit, that the water might tunne downe thither, and to bee received into some veilelliet or hanged vaderneth: Some that wyanted theetes, hanged up napkens, and elouts, and wyatched the sill they vycrethorow vver then vytinging and lucking out the warer. And that y water which fell downe and washed away e the Action of faying of the Ship, grad under foote, as bad as runlacth loven the kennell many times when it rayneth, was not bealth.

loft I warrant you, but watched and attended carefully (yea fomesimes with ftrife and contention)at every fcup-hole & other place where it ranne downe, with diffies pots, caunes & laries, wherof fome drunke harry drawghtes euen as it was, mudandall, withpur carrying to clente or lettle it. Others cle fed it first, but not one for it was to thicke & went to flowly thorow, that they mought illendure to tarry fo long, and were loath to loofe too much of Inch previous fluffe; fome licked with their tougues (like dogges) the boardes under feete, the fides, rayles, and Malls of the thippe others that were more ingenious, faltened girdles or ropes about the Masts dawbing tallow between them and the mast charine gaine might not runne dowine betweene) in Tuch fort, that shole ropes orgirdles hanging lower on the one fide then on the other, a spout of learner was tastened to the lowest part of them, that all the rayne drops that came running downerhe maft, might mett cogither at that place, and there bee received.

flether goracame of water by thole meanes, was spoken of fued to, and entired as anch man. Quam pultbrum digits would not dicier hard. Some of the poore span ards that we chad taken (who not with flanding had the lame allowance that our owne me thad) would come and crave of vs for the love of God, but some had; would come and crave of vs for the love of God, but some had; not with and my our great extremite, to reach them some humanity in steade of cheir accustomed barbarny, both to vs and other nations heeretofore. They put also bullets of leade into their mouthes, to stake their thirst.

Now in every corner of the shippe were heard the lamental ble cites of sicke & wounded men sounding woefully in our ears, crying out and puttifully complaining for want of dranke, beeing ready to dye, yea many dying for lacke thereof, so as by reason of this great extremity weelfully many more men, then were had done all the voyage before; having before this nine beck to well and sufficiently promided for, that were fixed in manner as well and beautiful.

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leasthfully, and dyed as sewe as if wee had beene in England, when

But the lecond daye of Decemb. 1, 89 was a feaffinall day with vs. for their rayned a good pace, and wee faued lome prety fore of ray ne water (though wee were well wet for it; and that ar midnight) and filled bett kinnes full belides : norwithflanding is were muddy and bitter With walking the thippe, but (with tome high which we that to we ten it withall) it went metrily downer. yet remembred wee and wifaed for with all our hearts, many a Conduit, Pumpe, Spring; and the came of cleare fweete running. waterin England: For how to cuer milerable we had accounteed some poore toules who the wee had feene driven for thirst to drinke therot, yet now happie we would have thought our selves if we might have had our fills of the fame yet hould wee have fased the better with this our poore teaffing, it wee might have had out me are and drinke (fuch and to much as it was) frand quietly Before vs, but befide all the former extremin s, wee were to total fed Seturnioyled with fuch horrible flormy setempefleous weasther; that eucly man had best hould taft his Camic, Cup, & Diff. in his trandes, yea & frimlette to thany mics, by the ropes, railes. orfides of the hippe, or the hee hould soone finde all vin der kette.

Hecrewith our maine layle was torne from the yarde and blowne ouerboorde quite away into the lea without recoverye, and our other fayles to rent and torne (from file to file of them) that hardly any of them escaped hole. The raging waves and forming larges of the lea came rowthing like mountaines one after are other, and ouerraked the wall of the shippe like amighty river routing oder it, wheras in faire weather it was neere 20, foore about the water, that now we might well cite out with the Poct.

 Yearather with the Princely Prophet Pfelm, 1 07, wetl 16. They mone up to be anon, and defrent to the deepe, it that their fortenelies have for trouble: they resis to and five, and flagger like a drunker way, and all their emening is gone. With this extremitte of fouls weather the hippe was lotoffed and flaken, that by the craking movie it made, and by the leaking which was now much more the ordinary, were were in great feare it would have flaken in funder, so that now also we had just cause to pray a little otherwise the the Poet, though marring the Verse, yet mending the meaning.

Deac maris & Czli, quidenim nifi vota faper funt,
Solvere quaffet z parcito membra ratis.

Notwithstanding it pleased God of his greate goodnes to delimera's out of this danger. Then forthwith a new maine sayle was
made and sastement to the yard. At the rest repaying as time & place
would suffer, which were had no sooner done, but yet againe were
were troubled with as greate extreamine as before, so that agains
we were like to hate lost our newe maine sayle, had not Massler
would or durst) wentured with danger of drowning by creeping
along uppon the maine yarde (which was let downe close by the
tayles) to gather it up out of the sea, and to tasten it theretoo, being
in the meane while offerings ducked ouer head and cares into
the sea.

Their flormes were to rerrible, that there were some inout companie, which confessed they had gone to seas for the space of twentic yeares, and had never seems the like, and vowed that it were they returned sate home, they would never come to Seasons.

The last of November at night wormer with an English ship, out of which (because it was too late that night) it was agreed that we should have had the next morning two or three Tunnes of wise which, as they faid, was althe provision of druke they had,

fair mely abundorowo ; which they must necke teleturist cheir beino vien betafterithet, wecheard of themno more is I till they were fee on grownd vpon the coast of Ireland, where it appeared that they might have spared we much more then they presanded they could, loas they mighe well baue relieved our gress necellities in band for freiencorshem lelude belides to being walles, and narrow windowes ke vinto Call the fortierate The findest December at night wee fooke with an other Eagl Min thipper and had forme beer out of her bee not fufficient to cary etal estimales est beilandes says es wartens sheet est and sond ruinated by the Earle of Deferend. The gringes of oblivious the total The nogealist weecame to an airker, montante from the Scholes under the land and winde, where we were fornewhat more quies? but the beeing househarbour to ride in) the house morning we werighbitenb weeg kanker; but hauling fome of our men house at the Capfton place where fairle to gine loude and leine it behinde houlding on one courte to Venere batten, where wee fafely anytied the time day stilas place beeing a very fale & leo puenier harbour furlys, shar noverweenight ting as wee had inft caute, a they the hunger. The towne is againe for ewhart carpen addensinallas by So found as weethad anchored hours my Labeledonic forthwish to thorre pand brought in preferity fresh vairer and fresh videal dilMingone; Pigger, Edenner, 822/10 refrellehiseningary within blockwich flanding fatefullis had taken before very lettere and rafe of the Athebat theories grathic company this for white time of a thinger was charing a linic field water left into measuring in a pair and things it is become and the first of the property of the particular of the particu are bresentials the Triffe of lease to detect find to lymin and Committed to the sale of the s

fact inthe temperation (as there) soft and bart plant for Ili This Dan an and isthe briefs To you time letted pair of leclandy igeonfiftellebebotont indjunctiveren from whomerforme imalleb docpentrode Onogalier lide it hath had Gatgs (as it formab) in times malthe eyaber and the port and fautas a Tomogovierro, 80 Catho alfahil Hehooles are montioningly built mild shicke from walles, and narrow windowes like vnto Castellas fine be they co. iched ricitime obisonblogyones introf the wild in a introffer wife, they of federal interior for their detenceds Galfelt IThe Galle 84 attates boules an abertalmon, four four, newborylander burnt, and ruinated by the Earle of Defmend. Thefe house do bles dottifyed theinfolores against binity and with french timendall his power pervader theland and winde, when the neiwe fur blud and ke of quest brevellmen deglementelblaw anoth stitethat the domestrad The and its in the fire place to the comment of the particular of the continue of Morwith Ganding while ft they a hus sleet indeduction to level go Onto. of them, yet aline geomidiled, aling successfrings to as greace extremisins durch stemen belieged by Transhe Romains Imperousing to elacipation characteristic de la company de hunger. The towne is againe somewhat repayped abusinesses disaction and another the demonstrate and the de lies land and bismiss in sheet houses prenimpsing believe of the aller mers of Pingolal terre respectively and aller and should be and should be a superior and a short of the complete and a short of the complete and a short of the company of the compa er este petas artisch abakt un bei ding shar gestilent peren analis providint fundation some and delication (barrod southers and strict in a specific from the providing the strict in oce besting distriction took coanditored leading transcription of the stranscription of

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Find for wice belonging there is repeated in Latinapage as a series of the forwire belonging there is repeated in Latinapas a sarray beyond the foliation of the foliation of the same of the promittion of the foliation of the fo

Good land was heere to bee-badder for forme pence the salue yearly rens Thoreard Mines of Allomor Thone, Braffe, and I-1900; Stapes we Swishero malerce as Christoll, parurally knul it, to that twee choic rather to denke water thebooming sail ber That parts of the country is all full of breate Mourraines and Hills, from whence came sunning downethe pleafants Archite of largere fresh running water. The natural thardoes of that patie on appeareth in this , that their small children runne viually in the midth of winsery R & downer the frequent herefoots at hardested with no other appared (many simes) lane onely amountalise comes the spinoe beeing very faire for vs. be ught vs ne sonbratengiade ow, The chiefe Officer of their Townsthey all their Sournigue, who hash shes ama affice and awbarity lamong, there that but Mainta bancowithus in England and bathhis Sorgrams to amend vponhim, and beare the Mace before him as our Maiors i drive Were were first enteresined are by Sourceigner house, which was one of those fourethes with flood the Karlo of Defended his school 19901 They have the land forme of countered prayer twood for ASSISTED AND THE TRANSPORT FOR FAR SANDER SOUTH She Soughing comet instructions with his Suggest before hints Kiths Shriffn and others of the Townshoppen whim and there they successive many himself paragraphet make his n Afresthis they airs and gas out of the Charle agains to hipko which being done then recupy agains involve Churche Action the Minuter beginneth prayers, and wares : 10.0

Their mismer of copelling differents for scholage from ours; part of the service belonging thereto is repeated in Latin, and part in It in The Minister take the children similarly and tirst dippeth it backewardes, and them for wardes four them also cares into the could be seen in the children wardes four them also cares into the could be seen in the children was incertained by also may appeare their naturall hardnes, (as before was specified.). They had nell their Bell, Drumme, nor Trumper; to wall the Parishioners togisther, but they expect till their Sourraigne come, and then they that hade any descended followed move against your so excises and then they that

They make their breadall in cakes sand, for the continuant, the Bakers bakers for attelle Tolonies of or order a www.basi bood

Villar, but it proved like a prefent Pargation to them that tooks it, so that wee chose rather to drinke water then it and a still but an a filled out selection of Decomb we looked from hence, having well provided our selucion feeth water, and other thinges necessary, being accompanyed with Sir Edward Denty, his Lady, and two young Sionness and a many and and a strong go to

This day in the morning my Lord going a more to dispatch away speedily some wells water that remayned for the Viciny, the winde beeing very faire for vs. brought vs newes that there were a spanish prizes taken and brought to England. For two or chase dayes weehad a late winder but afterwards it scanted to, that (as I faid before) were were fained to keepe a wold Chieffings with the Bishop and his Clarkes done has a late with the Bishop and his Clarkes done

After this wee met with an English ship, that brought vs iny stillinewes of 91. Spanship rizes that were come to England and surrowful newes with all the sic last and best Prize. Wee tooks, had suffeed supweak are place whom the coast of a single which this Coemis mentall and Epital, which this Coemis mentall and Epital, which this Coemis mentall and Epital, which this research and all the means the ship were strowned, save five or fix the one halfe English, the order Spanish that saved themselves with twinnings Bernotwithstanding much of the goods were saved, acreer under the new the street and the second were saved, acreer under the pools were saved.

of the country there, the worlden

DE

My Lord was very forry for Captaine Lifters death, withing -

that hee had loft his voyage to have faued his life.

*

The 29 of Decemb, we met with another shippe, that tould vs the same newes, and that Sir Marryn Frobisher, and Captaine Reymend had take the Admirall and Vice-Admirall of the Fleete that wee espeed going to Tarcera hauen. But the Admiral was sunke with much leaking, neere to the Iddy Stone, a rocke that lyeth ouer against Phinmonth sound, and the men were saued.

This ship also certifyed vs that Captaine Pressons ship had taken a Price loden with Siluer. My Lo: entred prefently into this thip, and went to Falmonth, and we held on our course for Plimmonth, At night wee came neere to the Ram Head (the next Cape Westwards from Plimmonth found) but we were afraide to double it in the night, mildoubting the scantnes of the winde. So wee Roode of to fea halfe the night, and towardes morning had the winde more large, and made too little spare thereof, that partlye for this cause, and partly through mistaking of the land, wee were driven fo much to leewards, that we could not double that Cape: Therfore we returned backe againe, and came into Falmonth hauen, where westruck on grownd in seventeene foote water: But it was a low ebbe, and ready againe to flow, and the grownde lofte, to as no hurt was done. Heere with gladnes we let foote againe Ponthe English grownd (long defired) and refreshed our schues with keeping part of Christmas vpon our natine loyle.



My Lord was very forry for Captaine Esters death, withing that hee had loft his voyage to have fautd his life.

The 19 of Decemb, we met with another flappe, if a tould vertice fame newes, and that Sir Maryn Frehsber, and Captainess of he famed had take the Admiral and Vice-Admiral of the Fleete that we cloyed going to Torcea haden. But the Admiral was further with thuch leaking, neere to the I dy Stone, a rocke that I oth our against Pharmous bound, and the men were lauxed.

This thip also certifyed vs that Captaine Presons thip had taken a Frice loden with Siluer. My Los cotred pretently into this thip, and went to Talmenth, and we held on our course for Plimmonth, At night wee cameneers to the I am Head (the next Cape Wellward from Planment's lound) be newcrealiaide to double it in the night, mildoubting the scantnes of the winde. Sowce floode of to teabalterhenight, and towarder morning had the winde morelarge, and made too futle iparcibereof, that parely e for this caule, and partly through milleking of the land, were were driven to much to leewards, that we could not double that Capet Therfore we returned backe againe, and come into Falmouth hanen, where wellivel on grownd in leuenteene focie water; Burne was alow ebbe, and ready againe to flew, and the grownde totre, so as no butt was done. Heere wish gladnes we let ke ote againe vponthe English gravend (long defined) and refreshed our kines with keeping part of Christmas voon our natine loyle.



Faultes escaped in the E. of Cumb. voiage.

Page.	Line.	Fault.	Correction.
8.	34.	the Castle,	the platforme.
16.		their,	hir.
19.	13.	vthna,	vlhua.
22,	2.	scup-hole,	scupper hole.
23.		for howfoeuer,	
	13.	yet now happy we would	& how happy we would now.
	25:	fide of,	fide fome of.
24.	20,	close by,	close to.
26.	4.	proceed. On either fide it,	proceed on either fide, It
28.	30.	Als, Eferta,	Als Efferne.
		Kundstrop,	Knudstrop.
IIII 2.	24.	was, ouertaken,	would be,
III 4.	8.	ouertaken,	yndertaken.





